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Pricing Grade A Milk Used in Manufactured Dairy Products

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ON THE COVER: Outdoor milk storage capacity at balancing plant.

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CONTENTS

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AN EMERGING PROBLEM

The production and marketing of milk in the United States is steadily moving toward an all Grade A supply. The proportion of the U. S. milk supply accounted for by manufacturing grade milk decreased from 39% in 1950 to 19% in 1976. Approximately 22 billion lb of manufacturing grade milk were marketed in 1976, a decrease of 12 billion lb in the 1966-1976 period. In 1976, 53% of the U. S. supply of manufacturing grade milk was located in Wisconsin and Minnesota. This is significant because competitive pay price series for manufacturing grade milk are drawn normally from the Wisconsin-Minnesota area. However, conversion to the Grade A market also is continuing to occur in Wisconsin and Minnesota, and in 1976 manufacturing grade milk had dropped to 35% of the milk supply in Wisconsin and 54% of the milk supply in Minnesota.

There is no certainty as to whether Grade A conversion will continue at its recent pace, nor is it clear when available supplies of manufacturing grade milk might be so limited that the appropriateness of pricing milk in regulated markets based on a competitive pay price in the unregulated manufacturing grade milk markets should be seriously questioned. A primary factor in conversion to Grade A milk is the difference between the Grade A blend price and the Grade B price. In 1976 in Wisconsin, blend prices averaged 46 cents per cwt higher than Grade B prices, and ranged from 35 cents higher (East Central Crop Reporting District) to 58 cents higher (Southwest). In Minnesota, the Grade A blend price averaged 62 cents per cwt higher than the Grade B price, and ranged from 42 cents per cwt higher (West Central) to 74 cents per cwt higher (Southeast).

One observation that can be advanced from these data is that at least in the short run, manufacturing grade milk plants in the upper Midwest may be able to hold their procurement at a 40 to 50 cents per cwt price lower than Grade A blend prices. It is not likely that the price differences will increase in real terms in the next few years. As noted in a recent study, ". . . it appears that a large proportion of the Grade B producers find important limitations to shift to Grade A production. . . One reason for no major acceleration of the shift is the lack of a large Grade A to Grade B price differential in Minnesota."[2]

While it is not clear that price incentives will prevail that will induce Grade A conversion, it is apparent that other factors such as quality considerations, market access, dual handling problems, and technological advances in milk production are explanatory in the conversion process. The dairy industry needs to anticipate further shifts toward a total Grade A situation and evaluate the implications of that shift to the pricing and marketing of producer milk.

The successful operation of the classified pricing system, as administered in regulated milk markets historically, has depended principally upon the existence of a nonregulated competitive price-making market for milk used for manufactured dairy products. Prices for reserve milk supplies in regulated markets generally have been established at levels equal to the unregulated manufacturing grade milk price. The pricing of reserve Grade A milk at the manufacturing grade milk price level assures that milk used for manufactured dairy products in regulated markets also will be priced at a level that normally will accomplish the market clearing function.

When most milk is Grade A, it is likely that competitive pay prices comparable to those now generated from manufacturing grade milk price data will not be available, and new pricing mechanisms for milk used for manufactured dairy products will be needed. The non-existence of manufacturing grade milk will eliminate the need to relate prices for reserve milk in regulated markets to prices in the unregulated manufacturing milk sector. The emerging question is: What should be the pricing basis for milk used for manufactured dairy products in Federal order markets? The question also extends to Class I pricing because of the widespread establishment of Class I prices in direct relation to competitive pay prices for manufacturing grade milk.

Since it is apparent that the present means of establishing reserve milk prices is in a process of being dissipated, the question emerges as to what alternative means of establishing reserve milk prices can be developed. In this study, four alternatives are spe-

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[2]Hardie, W. C. and J. W. Hammond. June 1977. Characteristics of Milk Production in Minnesota, 1967-1976 and Projections. Univ. of Minn., ER-77-6, pp. 30, 36.

cified for consideration and are analyzed. These alternatives include: 1) arbitrary retention of a competitive pay price series in a situation where all milk is Grade A and is pooled; 2) formulation of an appropriate product price formula(s); 3) consideration of the public hearing process for direct establishment of reserve milk prices; and 4) adoption of an economic index procedure for moving reserve milk prices.

BACKGROUND OF PROBLEM

Before World War I, sanitary regulations applying to milk for fluid use were little, if any, stricter than milk for use in manufactured dairy products. Production costs for milk for fluid use and milk for manufacturing were about the same. Producers in most areas were not organized effectively enough to price bargain with milk handlers. Because of the lack of special sanitary standards for fluid milk and the lack of bargaining power on the part of the producers, prices paid for milk by fluid milk handlers were about the same as prices paid by manufacturing handlers. Thus, the pricing of reserve milk supplies did not present serious problems. Some premiums were paid in the low production fall months, but generally volumes of reserve milk were small and not disruptive in the fall. Furthermore, handlers would stop buying from some producers if supplies were seriously out of line with requirements. This practice occurred particularly during the high production months in spring and early summer.

During the first 3 decades of the 20th century, stricter sanitary standards relating to milk for fluid use were enacted in most city milk markets. To meet the requirements of city or state health authorities, producers had to invest money in improving their milk producing facilities. To encourage producers to make these improvements, milk dealers had to pay premiums to producers for milk meeting the higher Grade A standards.

Milk dealers found that they could not induce producers to go to the extra expense of meeting sanitary requirements: 1) if they did not pay higher prices for Grade A milk, and 2) if they did not offer their producers a year-round market for their milk. Producers would not make the additional investment to produce Grade A milk without some assurance of a higher price for their Grade A milk throughout the year. Dealers no longer could cut off some of their regular producers when their milk was not needed and still be assured of adequate supplies of milk meeting sanitary requirements at other times.

On the other hand, milk dealers could not agree to accept unlimited quantities of milk at prices higher than its value for manufacturing. They were willing to pay a higher price for that portion of their producers' Grade A milk utilized in fluid form, but were understandably unwilling to pay more than the manufacturing milk value for supplies above their fluid requirements which they had to process into manufactured dairy products.

It was necessary to develop some means of pricing reserve supplies of milk that would be acceptable to both producers and dealers. Producer cooperatives, in order to obtain outlets for their members' milk at all seasons of the year, began to bargain for different prices for different uses of milk. Under this procedure, a price was established for milk for fluid use and a lower price related to manufacturing values was established for milk in excess of fluid requirements. This plan became known as the classified pricing plan and is used throughout the country today in Federal and State milk marketing orders, and in unregulated markets as well.

As it evolved, the plan presented and still presents numerous problems of equity among producers and handlers. Nevertheless, the plan has provided a milk pricing framework that is generally acceptable to producers and distributors alike. It has enabled orderly disposition of reserve milk supplies, and at the same time has provided a means of pricing Class I milk at levels high enough to assure adequate supplies throughout the year. Classified pricing probably has provided more stable prices to producers, handlers, and consumers than would otherwise exist.

OBJECTIVES OF RESEARCH

The problem of pricing reserve milk must be analyzed in terms of the overall objectives of milk order regulations. The objectives of Federal order pricing are to: 1) establish prices to producers which will assure an adequate supply of high quality milk for a market, and 2) promote the orderly marketing of milk in fluid milk markets.

With these legislative objectives in view, the following research objectives are noted:

1. To appraise existing U. S. Department of Agriculture policies and objectives for pricing reserve milk in Federal milk orders.
2. To specify objectives that must be recognized in the pricing of reserve milk.
3. To analyze three basic questions that over a long period of time have been central to the problem of pricing reserve milk.
    a. Should the same reserve milk price or prices be used in all regulated milk markets?
    b. To what level of efficiency should reserve milk prices be keyed?

c. What should be the number of reserve milk class prices, and which products should be included in each class?

4. To evaluate alternative methods for pricing reserve milk, including competitive pay prices, product price formulas, public hearings, and economic indices.

OBJECTIVES OF RESERVE MILK PRICING

In order to systematically analyze alternative procedures for establishing reserve milk prices, it is necessary that the several objectives of reserve milk pricing be defined as precisely as possible. A review of reserve milk pricing policy indicates that it has largely been directed at achieving the following primary objectives:

1. To price reserve milk at a level that encourages the maintenance of adequate manufacturing outlets for the disposition of reserve supplies.
2. To price reserve milk at levels closely related to the value of milk used for manufactured dairy products.
   a. To price reserve milk at a level that does not encourage it to be withheld from Class I usage when needed.
   b. To price reserve milk at a level that does not effectively under-cut unregulated manufacturing milk prices and thereby draw additional and unnecessary supplies into the marketwide pool.
   c. To price reserve milk at a level that assures that all such milk will be utilized, *i.e.,* will clear the market.
3. To price reserve milk so that reserve supplies will be allocated to those product uses that command the highest total return.
4. To price reserve milk at a level that does not arbitrarily affect resource allocation, *i.e.,* does not draw resources into milk production nor drive resources out of milk production, except as competitive manufacturing milk prices affect resource allocation.
5. To price reserve milk at a level that will provide equity within a market in terms of the costs of handling reserve milk, and will provide equity among markets in terms of competitive costs for raw milk.

It is evident that the several objectives of reserve milk pricing are not necessarily consistent with one another. Therefore, compromise among objectives is finally essential in order to establish precise regulations for establishing the actual class price(s) for reserve milk in administered markets. For example, it may be impossible to relate the reserve milk price to manufacturing grade milk prices and, at the same time, provide for the maintenance of adequate manufacturing facilities for reserve milk in given fluid milk markets. Or it may be impossible to provide for equitable price treatment for interests handling reserve milk in a market and also assure that prices for reserve milk among markets reflect competitive price relationships.

The conflict among objectives of reserve milk pricing presents a dilemma that defies any easy solution. In fact, a de-emphasis or by-passing of some objectives is required, even while the other objectives are advanced, because decisions on pricing reserve milk have to be made. As the milk industry continues to undergo change, the several objectives of reserve milk pricing will provide an essential framework for making decisions on reserve milk pricing that best accommodate the situation. The emphasis on each of the objectives may change as conditions change.

Alternative mechanisms for pricing reserve class milk must be evaluated in relation to the five objectives of pricing reserve milk. In addition, the price mechanisms must be evaluated on a pragmatic basis in terms of three administrative criteria. The administrative criteria are:

1. The price mechanism must generate reserve milk prices on a current, continuing, and efficient basis.
2. The price mechanism must avoid undue complexity and be generally understood.
3. The price mechanism must lend itself to practical operation as an essential provision in market order regulations, *i.e.,* it must be workable.

COMPLEXITIES OF ESTABLISHING RESERVE MILK PRICES

The prices of the so-called "hard" manufactured products (butter, cheese, and nonfat dry milk) are established in a national market and, in periods of excess milk supplies, are strongly influenced by CCC purchase prices. Regulated handlers producing such products have no opportunity to adjust prices at which they sell such products to assure adequate margins relative to the price for reserve milk established under a milk order. Therefore, the level of the reserve milk price relative to the more or less fixed revenues on manufactured products, as determined by the national market, tends to prescribe the margins a processor realizes on reserve milk. If all the reserve supplies of milk are to be marketed in an orderly way and the market cleared, the price for reserve supplies of milk over time must be closely related to net revenues available from the sale of manufactured products.

Volumes of reserve milk handled vary substantially between markets and between individual handlers in a market. In addition, there are wide differences among and within markets in the variability of the amount of reserve milk processed from day to day and seasonally. This influences reserve milk processing costs. There also are differences in plant efficiencies among and within markets. Further, there are differences among and within markets in the kinds of products for which surplus milk is utilized. Different products, at times, have considerably different use values. All of these factors make it difficult to arrive at a single reserve class milk price which will be acceptable to all parties. Because of these differences, the level of price for reserve milk affects different producer organizations differently and has a significant impact on competitive relationships. Thus, some parties favor a low price for reserve milk and others a high price.

Reserve milk class prices over time must track average net revenues from manufactured products. If the prices do not correspond closely to the average net revenues obtained from the sale of manufactured products, mis-allocations in processing capacity or the utilization of milk may result. For example, if reserve milk prices are too low relative to product prices and costs of processing, unduly wide profit margins will result. Added manufactured product capacity may be attracted by such a pricing error. Regulated handlers may procure additional supplies of milk solely for manufacturing purposes. The extra milk could reduce blend prices which eventually might require Class I price increases to induce adequate supplies. Also, contrary to both producer and public interest, milk supplies may be held for manufacturing rather than being made available for fluid use, resulting in excessive handling charges for milk for fluid use.

Unregulated manufacturing plants tend to be placed at a competitive disadvantage if Federal order reserve milk prices are lower than going prices for manufacturing grade milk. With the specialization that exists in the handling of reserve milk, too low a reserve milk price places those handling the reserve supplies at an advantage relative to other handlers in the market.

Too high a reserve milk price relative to product prices creates equally serious consequences. If the reserve milk price is too high, handlers will generally be less willing to handle such milk because of the losses involved and disorderly marketing may result. It also may mean that cooperatives will be forced to handle the reserve, even if at a loss, since one important function of a cooperative is to guarantee a market for the milk of its members. When cooperatives are forced to handle reserve milk supplies at a loss, inequities are created between members of operating cooperatives who handle the reserve, and bargaining associations and nonmembers. The inequity is undesirable since cooperatives, or others handling reserve supplies, provide a necessary service for the market in balancing supplies.

The problem of pricing milk used for manufactured dairy products can finally be defined in four dimensions: 1) the need to determine an appropriate price level for reserve milk; 2) the need to specify a pricing mechanism that will effectively establish reserve milk prices on a continuing basis; 3) the need to determine the extent to which the price of milk for manufacturing may vary a) spatially, and b) among producer groups; and 4) the need to define the number of reserve price classes appropriate to the several manufactured dairy products.

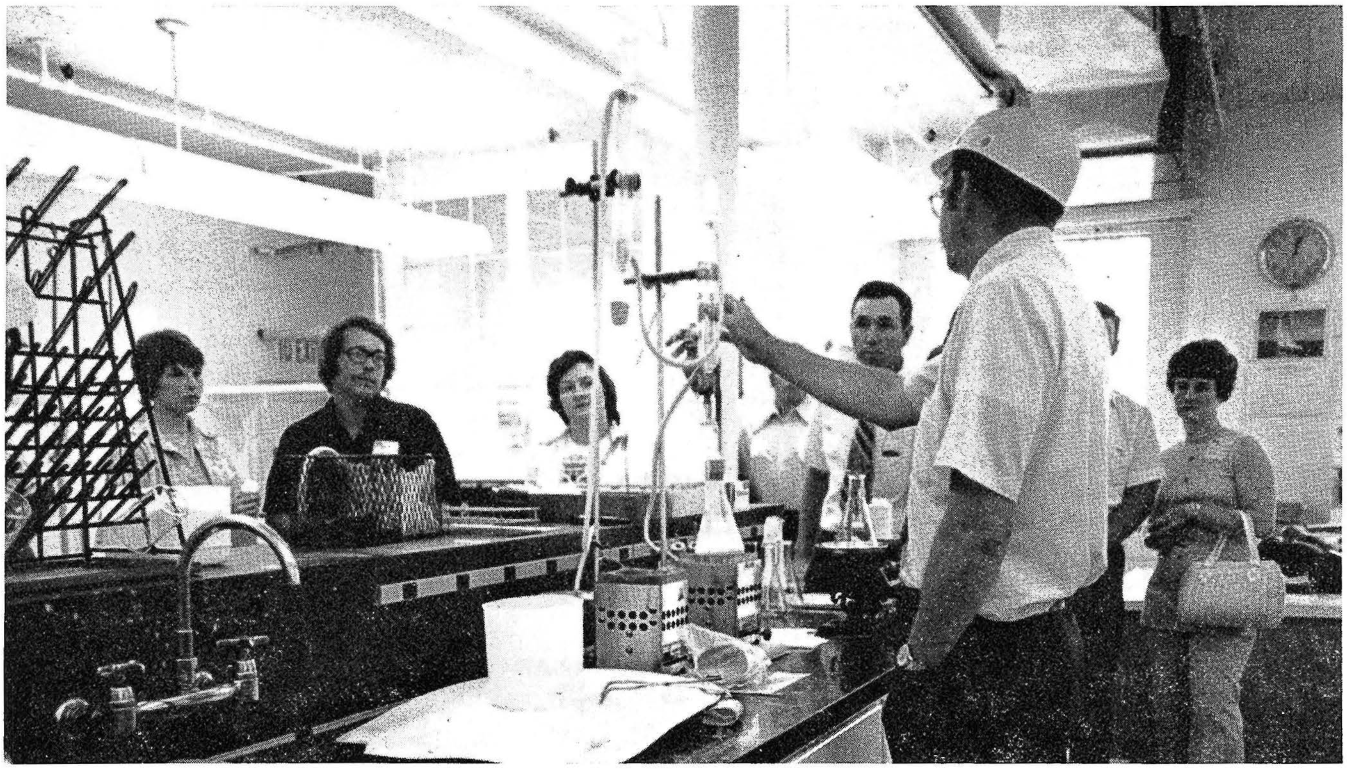
EXPERIENCE WITH RESERVE MILK PRICING IN FEDERAL ORDER MARKETS

In the early years of the Federal milk order program (1937-1945), order regulations covered a limited number of widely separated metropolitan markets. Because milk was delivered to markets exclusively in cans, and transportation and refrigeration equipment were not dependable, shipments of individual dairy farmers were associated with particular plants where the milk was received each day.

The objective of reserve milk pricing policy through the 1940's was to price reserve supplies at a level which would provide an outlet for all milk not needed for fluid use. The basic principle in establishing prices for milk in manufacturing uses was to relate the pricing to the "going" or "competitive" value of milk for such use. Prices were based on formulas reflecting prices paid by unregulated plants making manufactured dairy products or upon wholesale prices of one or more manufactured dairy products. In 1948, 23 order markets based prices of milk used in manufacturing classes, at least in part, on the prices paid by specified manufacturing plants, either the Midwestern Condensery price series or local plant averages. A butter-nonfat dry milk combination was used in formulas in 24 markets, and a butter-cheese combination was in use in 12 markets. Other formulas were based on cheese alone, cream-nonfat dry milk, and butter-casein.[3]

In a number of markets, multiple manufacturing use classes were established. In some markets where

[3]Harris, Edmond S. and Irwin R. Hedges. Dec. 1948. Formula Pricing of Milk for Fluid Use. Farm Credit Administration, USDA, p. 6.



Laboratory testing of nonfat dry milk for moisture content at reserve milk manufacturing plant.

surpluses tended to be large and plants scattered and of various types, milk for evaporating was classified in a category above that for milk used for butter and cheese. In several markets, cottage cheese was in a separate use classification. To facilitate the disposal of surplus milk, some orders permitted milk in a given class to be segregated for pricing purposes. In the Boston market, for example, milk for both butter and cheese was specially priced below the Class II category on a seasonal basis. This permitted milk to be moved to manufacturing plants outside the market when the usual manufacturing facilities could not handle all of the surplus milk.

By the end of 1941, 5 of 17 orders provided for one manufacturing use class and 12 orders provided for two or more manufacturing use classes. By 1945, 8 of 26 markets had one manufacturing use class and the other 18 had two or more manufacturing use classes.[4]

At one time, as many as eight separate manufacturing use classes were employed under the New York order to: 1) reflect the use value of milk in such products individually, and 2) insure that the milk associated with each plant would be accepted for processing.

[4]Purcell, Margaret R. and Louis F. Herrmann. Dec. 1958. Experience with Classification of Milk in Federal Order Markets. AMS, USDA, MRR No. 288, p. 18.

About 1950, a growing feeling developed that the number of reserve milk classes should be limited and more emphasis should be placed on returning to producers the highest possible price for reserve supplies going into manufacturing uses. This could best be achieved with a single reserve class. By the end of 1957, 56 of the 68 orders in effect provided for only two use classifications—one for fluid use and one for manufacturing use.

In the late 1950's, a disenchantment with product price formulas emerged. In part, this was due to the tendency for product price formulas to remain in effect for long periods of time without a change in the make allowance. The make allowance and other elements of the formula may have reflected competitive pay prices in an area at the time of adoption, but as time went on, new technology and other factors affecting plant operating costs brought about significant changes in costs and the make allowance became obsolete.

By the early 1960's, the problem associated with the use of different measures of price for reserve milk in different areas began to emerge. The Northeast-Midwest problem involved a concern on the part of the Midwest manufacturing industry regarding prices for reserve milk in the Northeast that were established at significantly lower levels than the going value of manufacturing milk in the Midwest. This situation appeared to place Midwest firms at a competitive disadvantage in selling dairy products in the East.

The Northeast-Midwest situation brought into focus the problems and pressures that develop if reserve milk is priced at different levels in different markets. In attempting to resolve the problem, emphasis was put on need for uniformity and consistency in order provisions, including those for pricing reserve milk. A decision following a hearing on the Northeast markets in 1962 contained the following statement:

"In the present hearing, the evidence presented, taken in its entirety, represented a broad, almost nationwide viewpoint concerning the implications on the national markets for dairy products when prices in the Northeastern markets for milk in manufacturing uses tend to depart from the general level and trend of prices to dairy farmers generally for milk in these uses. The milk used in manufactured products under these orders, and particularly Order No. 2, represents significant quantities. The large urban areas of the Northeast represent principal markets for manufactured dairy products such as butter and cheese produced in other parts of the nation. Thus, on the basis of the evidence presently before the Secretary, the pricing of reserve milk to producers in the Northeastern Federal order markets is no longer a matter of local economic interest only and, therefore, cannot be dealt with simply in local terms."[5]

Another consideration in shifting away from product formulas was the elimination of problems associated with make allowances. Competitive pay prices automatically reflect changes in plant efficiencies; they also reflect prices reported paid by plants rather than prices that plants could afford to pay. The widespread adoption of the Minnesota-Wisconsin manufacturing grade milk price series as the basis for pricing reserve milk grew out of these considerations. The 1961 Chicago decision on reserve milk pricing stated:

"The use of the competitive pay price method of pricing milk is based upon the premise that in a highly competitive economy, dairy concerns will tend to purchase milk at prices commensurate with the more efficient concerns' ability to pay for the product. As shifts occur in the relationship between finished product prices, one group of processors may be able to pay higher prices. The other processors must meet or approximate these prices, or lose their supplies. If a dairy concern fails to make the necessary adjustments, it will, in time, be forced out of business. Increasing labor and other costs will tend to reduce prices paid for milk. On the other hand, the use of new assembling, processing, packaging, and marketing techniques, which reduce costs or increase product returns, will tend to increase prices paid for milk. These upward or downward adjustments in costs would be automatically reflected in reserve milk prices by using the competitive pay prices method of pricing."[6]

In effect, since the early 1960's USDA policy has been to move toward the establishment of essentially uniform prices for reserve milk supplies in all markets and to keep such prices up to date with changes in conditions in the dairy industry, as measured by prices paid for such milk in the open-competitive market.

Some special situations continued to be observed. The butter-powder "snubber" price was specified in a number of markets where butter-powder plants handled most of the reserve milk. This option provided relief to butter-powder plants at times when the value of cheese was high relative to the value of butter and powder. The findings and conclusions of the decision to adopt the butter-powder snubber in the Puget Sound market included the following:

"Recognition should be given, nevertheless, to the possibility that a particular segment of the manufactured milk industry may be unduly influenced occasionally by certain supply-demand conditions not affecting the remainder of the industry. Such conditions may not be reflected sufficiently in the Minnesota-Wisconsin price series. Because of the importance of butter and powder manufacturing in this market, it is desirable that the Puget Sound Class II price not exceed a price level based on a butter-powder formula. Using a butter-powder price as a ceiling will insure that the Class II price will continue to reflect the product values of butter and powder in the event of an undue divergence in the relationship between such values and the Minnesota-Wisconsin prices. If the Class II price is too high relative to the value of the residual uses for surplus milk, the associations cannot handle such milk except at a financial loss. In this circumstance, members of the associations would be penalized relative to nonmember producers on the market."[7]

[5] Federal Register, Jan. 26, 1962, 27:308.

[6] **Ibid**, August 9, 1961, 26:7136.
[7] **Ibid**, May 13, 1966, 31:7066.

In the early 1970's, hearings were held to provide uniform classification provisions. During the course of the hearings, considerable attention was focused on the pricing provisions for reserve milk which varied among the markets. While emphasis was on the classification provisions, it became apparent that the Federal order program could not deal with classification provisions without considering the pricing of reserve milk supplies. Reserve milk pricing provisions were thus subject to extensive review. As a result of the hearings, uniform classification provisions and adoption of the M-W price as the sole factor in moving prices for Class III and Class II milk were implemented in 39 Federal order markets.

A number of markets not involved in the classification hearing used the lower of the butter-powder formula price or the M-W price as the Class II price. When the butter-powder snubber price began running substantially below the M-W price in the last quarter of 1973, immediate action was needed to eliminate the competitive disparity. The decision to remove the butter-powder snubber provided the following explanation:

> "A compelling reason that immediate action be taken is to eliminate the competitive disparity that currently exists between processors of reserve milk in the eight markets under consideration and similar processors in other Federal orders and unregulated processors of manufactured dairy products. The competitive market for products manufactured from reserve milk is essentially national in scope. Hence, dairy products manufactured from Federal order priced reserve milk compete with products made from unregulated manufacturing grade milk. In recognition of this fact, it is essential that prices for reserve milk be maintained at comparable levels among Federal order markets with prevailing competitive pay prices for manufacturing grade milk at plants buying such milk.
>
> "Under existing circumstances, the current prices of reserve milk, as established by the butter-powder price formula in the eight markets under consideration, are substantially below the competitive market value of milk for similar uses in other Federal orders and unregulated processors of manufacturing grade milk. Processors of reserve milk in the eight markets have a substantially lower milk cost, and thus, higher gross margins are available to them than for their competitors. This disparity, if permitted to continue, will lead to dislocation of normal efficient marketing channels. To achieve competitive equality, it is necessary to provide uniform pricing of reserve milk under the eight orders herein considered and the adjacent nearby orders to the West, as well as align such prices with the competitive pay prices being paid for the majority of the unregulated manufacturing grade milk in the United States. It is concluded, therefore, that this objective can best be achieved through the use of the Minnesota-Wisconsin price series. It is quite evident that current reserve milk prices in the eight markets herein considered are not providing producers a return for that portion of their milk utilized in manufactured dairy products reflecting its full use value. Producers should not be expected to continue to accept less for their milk not needed for Class I uses than its full value."[8]

Over the years, changes in the pricing of milk used in manufactured products have included: 1) re-

[8] *Ibid*, March 29, 1974, 39:11567-8.

TABLE 1.—Pricing Factors Used for Reserve Milk Pricing in Federal Order Markets for Selected Periods, 1956 to 1978.

Price Factors	No. of Markets December 1956	October 1967	October 1971	January 1978
Minnesota-Wisconsin price only	0	31	30	42
U. S. manufacturing price only	1	8	2	0
Local plant price only	11	0	0	0
Product price:				
One	16	10	7	0
More than one	4	4	4	0
M-W price in conjunction with:				
Another competitive pay price	0	2	0	0
Product price	0	15	18	5
Other competitive pay price(s) and product price(s)	37	4	1	0
Total number of markets	68	74	62	47

placement of product price formulas with competitive pay price formulas, 2) elimination of local plant averages as a competitive pay price factor, 3) substitution of the Minnesota-Wisconsin manufacturing grade milk price for the Midwestern Condensery price and the U. S. Average Manufacturing Grade Milk price as the competitive pay price, 4) adoption of the M-W price in all markets as the price mover for milk used in manufactured products, and 5) placement of greater reliance on regional hearings to deal with reserve milk pricing because of the problems of making price decisions on a piecemeal basis. Table 1 shows the pricing factors used for reserve milk pricing in Federal order markets for selected periods from 1956 to 1977.

At the present time, as shown by the data in Table 1, the Minnesota-Wisconsin price is the sole factor used for pricing reserve milk in 42 of the 47 Federal order markets. In the other five markets, all in the Northwest, the Minnesota-Wisconsin price is used in conjunction with the butter-powder snubber to price reserve milk. However, the butter-powder snubber has not been the effective price in those five markets since March 1976 because the specified make allowances no longer fit the situation.

COMPLEX ISSUES IN RESERVE MILK PRICING

Two difficult questions complicate the administration of reserve milk prices. These are: 1) Should the same reserve milk price be implemented in all regulated markets, even when reserve milk handling costs may vary among markets? and 2) Should one reserve milk price class be defined, or would reserve milk pricing policy be better served by defining multiple reserve milk use classes? While an attempt is made to keep these two matters separate, several similar factors relate to each question. The underlying matter of what efficiency level reserve milk prices should be geared to is implied in both questions.

Reserve Milk Prices in Different Markets

A continuing issue in the question of reserve milk pricing is whether or not the same reserve milk price should be used in all regulated markets. Since there is a general presumption that reserve milk in different markets is processed into similar products, and these products, such as butter, nonfat dry milk, and cheese, move in national distribution at very low transfer costs, the apparent answer to the question is that, indeed, the same price for reserve milk should be adopted in all markets. Otherwise, handlers of the manufactured dairy products would be arbitrarily advantaged or disadvantaged in different markets, depending on the specific reserve milk price they were charged. However, several questions complicate the issue.

Three of these questions include: 1) What kinds of variations exist in the usages of reserve milk by type of product among markets? 2) What kinds of variations exist in the volumes and costs of reserve milk among markets? 3) What kinds of variations exist in terms of who is responsible for disposition of reserve milk among markets?

Product Differences Among Markets

In some markets and in some regions of markets, considerable product specialization occurs in the processing of reserve milk. In such cases, a strong rationale can be advanced for establishing the reserve milk price primarily in relation to the specific products manufactured in that market. For example, if most of the reserve milk in a market is manufactured into butter and nonfat dry milk, it makes sense from a market clearing viewpoint to price the reserve milk in that market on the basis of the value of milk for butter-powder. Otherwise, the reserve milk price may differ substantially from what local handlers economically could afford to pay; or, in the opposite situation, the reserve milk price may be at levels that give local manufacturers a substantial economic advantage.

In fact, there is substantial product specialization in many markets. The state of California, which is not a participant in the Federal milk order program, establishes a reserve class price using a butter-powder formula because the dominant usage of reserve milk in the pool is for butter and nonfat dry milk. Processors of reserve milk in California maintain that they would be in an untenable marketing position if they were subject to a reserve price that was not sensitively geared to wholesale prices for butter and nonfat dry milk.

Similarly, in some Federal order markets where butter and nonfat dry milk dominate the usage of Class III (reserve) milk, butter-powder price options have been made available and continue to be available as a means of assuring that reserve milk will be priced at levels that will not penalize those interests who have the responsibility for disposition of reserve milk.

The Federal order program has detailed data on the extent to which there is product specialization of reserve milk usage by market. Increasing proportions of reserve milk have been used for cheese manufacture in recent years, while usage for butter has been trending downward. In 1970, 67% of the reserve milk used for manufacturing butter and cheese in Federal order markets was used for manufacturing butter. By 1975, butter and cheese were using almost equal volumes of reserve milk. However, among individual markets, considerable variation exists in how Grade A reserve supplies are utilized. Data on the differences among markets in 1975 are shown in Table 2. For the 34 markets identified in Table 2, butter accounted for more than two-thirds of the butter-cheese milk usage in 13 of the markets. In six markets, cheese accounted for more than two-thirds of the butter-cheese usage of milk. In 15 of the markets, butter and cheese together accounted for more than two-thirds of the butterfat utilization.

Volume Differences Among Markets

Different volume factors in different markets affect the quantities and costs of reserve milk available for manufacture. As a result, the costs of processing reserve milk in plants in different markets vary. In some markets, the total annual volumes of reserve milk are much greater than in other markets. Also, volume fluctuations associated with production seasonality, consumption seasonality, and daily market operations differ among markets, causing higher costs of handling reserve milk in some markets as compared to others. The differences in reserve milk volume factors among markets which are associated with cost differences in handling reserve milk among markets lead inevitably to the question of whether or not such differences should be recognized in establishing reserve milk prices.

Volume and Utilization Differences Among Markets. The percentage of producer deliveries used in manufactured dairy products varies substantially

TABLE 2.—Butterfat in Butter and Cheese as Percentages of Total Butterfat Used in the Production of the Two Products and as a Percentage of Total Butterfat Used in the Production of Manufactured Products, Federal Order Markets, 1975.

	Percent of Two-product Total Butterfat Used in		Percent of Total Manufactured Product Butterfat Used in
	Butter	Cheese	Butter and Cheese
Eastern South Dakota	100.0	0	80.2
Chattanooga	95.1	4.9	41.5
Oklahoma Metropolitan	94.6	5.4	68.8
Nebraska-Western Iowa	75.9	24.1	73.4
Minnesota-North Dakota	74.7	25.3	89.6
Indiana	73.5	26.5	60.0
Ohio Valley	71.0	29.0	43.3
North Central Iowa	70.9	29.1	51.2
Nashville	68.5	31.5	68.2
Puget Sound	68.5	31.5	68.9
Georgia	67.5	32.5	47.3
Kansas City	67.5	32.5	86.4
Des Moines	66.9	33.1	82.5
Southern Illinois	65.2	34.8	77.9
Louisville-Lexington-Evansville	64.8	35.2	66.6
Paducah	59.9	40.1	52.9
Southern Michigan	59.2	40.8	51.1
Oregon-Washington	58.5	41.5	70.5
Middle Atlantic	50.7	49.3	33.1
Eastern Colorado	50.0	50.0	52.5
Central Illinois	48.9	51.1	56.8
Quad Cities-Dubuque	48.8	51.2	82.4
St. Louis-Ozarks	47.5	52.5	45.4
Minneapolis-St. Paul	44.0	56.0	92.4
Appalachian	42.2	57.8	50.4
Northern Louisiana	38.6	61.4	42.7
Texas	36.8	63.2	35.7
New York-New Jersey	36.7	63.3	45.5
Boston Regional	31.6	68.4	43.8
Eastern Ohio-Western Pennsylvania	24.5	75.5	41.5
Great Basin	23.7	76.3	71.4
Southeastern Minnesota-Northern Iowa	22.1	77.9	40.2
Chicago Regional	21.2	78.8	78.4
Texas Panhandle	4.3	95.7	8.5

TABLE 3.—Distribution of Federal Order Markets According to the Volume and Percentage of Milk Used in Other Than Class I, 1975.

Percent of Milk in Non-Class I Usage	No. of Markets	Percent of Markets	Vol. of Milk (bil. lb)	Percent of Volume
1-10	4	7	0.13	1
11-20	11	20	0.75	2
21-30	6	11	1.44	5
31-40	15	27	8.45	29
41-50	13	24	9.10	31
51-60	3	5	1.19	4
61-70	2	4	7.47	26
71-80	1	2	0.62	2
Total	55	100%	29.15 bil. lb	100%

among markets. In 1975, the percentages of milk in other than Class I usage ranged from 8% to 77%. In 21 markets, the percentage of milk used for non-Class I products was less than 30%, while 6 markets reflected reserve milk usage of more than 50% (Table 3). It is also evident from Table 3 that, in general, larger markets had higher percentages of milk used for other than Class I purposes. For example, the 21 markets showing less than 30% of their milk going for non-Class I usage accounted for only 2.32 billion lb (8%) of the reserve milk category. At the same time, the six markets showing more than 50% of their milk going for non-Class I usage accounted for 9.28 billion lb (32%) of the reserve milk category.

Since higher unit manufacturing costs are usually associated with smaller and more variable volumes of milk, it has been observed that the cost of handling reserve milk in some of the smaller and higher Class I utilization markets may be higher than in other fluid milk markets. The question of whether or not an adjustment in the reserve class price should be implemented in order to wholly or partially offset the cost differences must then be considered.

Another dimension of this problem is that, within a given market, the responsibility for processing reserve milk or non-Class I usage falls disproportionately on the different handlers in the market. The data in Table 4 illustrate the situation.

To use the Georgia and Kansas City markets as an example, in both markets there were three handlers with less than 20% Class I utilization. However, in the Georgia market these handlers apparently were small and accounted for only 12% of the market's reserve supplies, while in the Kansas City market the three handlers accounted for nearly one-half of the reserve supplies. Since the disposition of reserve milk represents an essential service to the total market, it has been argued that the price obligations of the non-Class I handlers should be "fair" or economic not only in terms of the market values of the products manufactured, but also fair in terms of the principle that all handlers in a market have a responsibility for the necessary reserve requirements in the market. It is argued that some relief in the costs of handling reserve milk should be provided by establishing reserve class prices that offer some counter-balance to the higher costs.

TABLE 4.—Distribution of Handlers by Percentage of Handlers' Receipts Used in Other Than Class I, and Percentage of Receipts Handled by Those Handlers with Class I Utilization Less Than 20%, Selected Markets, December 1975.

Percent of Handlers' Receipts Used in Other Than Class I	No. of Handlers in Market				
	Georgia	Kansas City	Puget Sound	St. Louis-Ozarks	Southern Illinois
0-20% Non-Class I	23	9	6	12	5
21-40%	7	8	4	5	8
41-60%	1	6	1	3	3
61-80%	1	1	1	1	3
81-100%	3	3	4	2	7
Total handlers in market	35	27	16	23	26
Handlers in 81-100% group:	Percent				
Percent of total handlers in market	9	11	25	9	27
Percent of total market non-Class I handled by these handlers	12	45	70	11	17

Other Factors Affecting Costs of Handling Reserve Milk Among Markets. Substantial variation in costs of processing in nonregulated manufacturing dairy plants is illustrated in most cost studies of the dairy industry. In the 1965 Minnesota-Wisconsin study, operating costs were collected for 52 dairy plants. That analysis showed per hundredweight costs of butter plants to vary from 88 to 111% of the average cost for all butter plants. Butter-powder plant costs varied from 85 to 118% of average costs. Cheese plant costs varied from 84 to 103% of average costs.[9]

Under Federal orders, regulated manufacturing milk plants must all pay the same prices for manufacturing use milk, regardless of the cost situation they face. Yet there are a number of reasons why regulated manufacturing milk plants in many order markets probably have lower levels of efficiency than non-regulated plants and, therefore, higher processing costs. First, the M-W price is the pay price for plants in an intensive milk producing area where there are large numbers of plants, and where supposedly it is relatively easy for plants to obtain volumes of milk to achieve efficient sized operations. The volumes of surplus milk in some Federal order milk markets are so small that there are no manufacturing facilities within the market. In Georgia, for example, there are no plants for making butter, nonfat dry milk, or hard cheese. When milk surplus in excess of fluid and soft manufactured dairy products develops, it is transported to Tennessee for processing. The cooperative handler of the milk reports that it netted an average of 37.6 cents per cwt less than the Georgia surplus price because of the extra hauling associated with the milk.[10] However, the same cooperative realized an average return in 1971 of 9.7 cents per cwt over the Nashville Class II price on surplus milk that it moved to non-pool plants for manufacturing.[11]

Even where the Federal order markets have locally regulated manufacturing milk plants to handle surplus, it is argued that they are likely to be less efficient than non-regulated manufacturing milk plants in Minnesota and Wisconsin. The major argument is that they have greater variation in milk volumes than nonregulated plants. Most, if not all, of the seasonal variation in milk supplies in regulated markets is borne by the surplus plants. Two cooperative surplus plants in Tennessee and Louisiana reported volumes of less than 500,000 lb in September 1970—the low production month. In April, volumes reached 23.9 million lb in the Tennessee plant and 5.8 million lb in the Louisiana plant.[12] The volume in the one case was almost 50 times as great in 1 month as another. In Minnesota, on the other hand, each manufacturing plant probably faces annual supply variations similar to the state average for all milk production. For 1975, the production in the high month was 58% greater than in the low month. Reserve milk seasonal variation in Federal order markets reaches 250% of the low month's receipts in the St. Louis-Ozarks and Georgia markets and 350% in the Georgia market (see Table 5).

Federal order manufacturing milk plants also have substantially greater day-to-day variations in milk supplies. Fluid bottling plants normally bottle milk for fluid distribution 5 days a week, Monday through Friday. Some plants occasionally bottle milk on Saturday. Packaged milk sales, furthermore, peak on Thursday and Friday. Thus, to meet these needs plus weekend sales when no bottling is carried out requires larger quantities of milk in fluid plants on Thursdays than any other day of the week.

Data in Table 6 for the Chicago market show how daily reserve milk supplies fluctuate at the supply plant level on a seasonal basis.

The volumes of milk shown in the table represent the extra milk on that particular day that the cooperatives had to use for manufacturing. It is evident that during the flush season there were substantial volumes of reserve milk available for manufacturing on each day of the week. However, in November volumes of reserve milk were down in total and substantial fluctuations occurred on a daily basis. Both seasonal and daily fluctuations in reserve milk volume aggravate the cost problem in handling reserve milk. It is generally accepted that a stable volume of reserve milk at capacity would be associated with minimization of handling costs.

The Chicago market pools a large volume of milk annually and reflects a relatively low Class I utilization. Both of these factors tend to maintain volumes of reserve milk supplies at levels that can be handled economically. Many other fluid milk markets have smaller pools and higher Class I utilizations. As a result, costs of handling reserve milk, particularly with respect to the problem of daily fluctuations in the flush season, would be high as compared to the Chicago situation. In some instances, costs would be high enough to preclude the construction of any local manufacturing facilities. As a result, other means of handling the reserve milk, such as diversion to more distant manufacturing plants, have to be implemented. Such alternatives are also costly because of the increased handling and

[9] **Ibid**, p. 18.
[10] **Ibid**, March 6, 1974, 39:8717.
[11] **Ibid**.

[12] **Ibid**.

TABLE 5.—Index of Daily Average Volume of Milk Used for Non-Class I Products by Month, Selected Markets, 1973-1975. (12-month average for each market = 100.)

Month	Chicago			Middle Atlantic			St. Louis-Ozarks			Southeast*			Georgia		
	1973	1974	1975	1973	1974	1975	1973	1974	1975	1973	1974	1975	1973	1974	1975
January	94	86	85	97	88	96	92	78	77	99	73	81	119	85	82
February	103	93	93	94	94	102	98	88	80	92	96	94	98	118	104
March	108	101	101	99	104	112	107	107	107	112	123	116	123	150	135
April	122	109	107	115	109	105	134	133	122	161	131	139	157	120	136
May	125	117	116	117	119	121	150	150	144	151	138	143	104	107	105
June	127	128	124	112	116	116	130	148	135	139	158	154	124	147	147
July	113	114	108	106	104	102	114	122	116	101	117	117	73	82	109
August	94	100	98	97	106	105	94	105	94	86	85	98	81	72	88
September	82	93	85	90	95	82	71	82	75	59	70	49	63	72	48
October	76	83	81	88	86	75	65	65	70	49	62	46	60	56	42
November	73	82	88	84	85	94	69	56	87	47	56	75	50	62	77
December	85	93	97	102	94	91	77	66	91	92	91	96	149	127	125

*Includes Appalachian, Tampa Bay, Southeastern Florida, Upper Florida, Georgia, Louisville-Lexington-Evansville, Nashville, and Chattanooga.

TABLE 6.—Daily Average Receipts Minus Shipments to Distributing Plants by Five Operating Cooperatives, June and November, 1969.

Day	Amount of Milk Available for Manufacturing: June 1969	November 1969
	(mil. lb)	(mil. lb)
Sunday	3.45	1.87
Monday	2.96	0.46
Tuesday	3.28	0.89
Wednesday	3.23	1.05
Thursday	2.93	0.96
Friday	3.45	1.58
Saturday	3.38	2.35

transportation involved. The question is whether or not some recognition of cost differences should be considered in establishing reserve class milk prices.

One of the difficulties in allowing reserve milk pay prices in Federal orders to reflect different costs is objectively determining what the differences are and which one should be allowed for in reserve class pricing. Any allowance will undoubtedly continue to result in inequities—inequities between regulated plants within a market, between regulated plants in different markets, and between regulated and nonregulated manufacturing milk plants. The USDA has taken the position that the additional costs, because of efficiency differences, are costs of servicing the fluid market—costs of balancing fluid milk supplies with fluid milk needs. It is maintained that these costs should therefore be reflected in service charges to buyers of milk for fluid purposes.

The question of adjusting the reserve milk price to reflect costs clearly is a complicated one. However, in measuring the question against the several objectives of reserve milk pricing, the inference is that reserve milk pricing policy can be better served by avoiding adjustments in the reserve milk price that would reflect reserve handling costs. Market service charges in the fluid market, whether effected by cooperatives or authorized by order provisions, would be the preferred means of recovering the costs of handling reserve milk.

Differences Among Markets in Terms of Cooperatives' Role in Handling Reserve Milk

A primary service that dairy marketing cooperatives provide milk producers is that of guaranteeing a market. In the process of guaranteeing a market, cooperatives move into a major responsibility in the handling of reserve milk supplies. Considerable variation exists among regions and among markets with respect to the proportion of milk producers who are members of cooperatives, and with respect to the proportion of reserve milk handled by cooperatives. In all Federal order markets, as of December 1975, 86.4% of producers shipping to market were members of a cooperative association. Among the nine regions of Federal order markets, the Middle Atlantic region had the lowest percentage of producers in cooperatives, and the Mountain region had the highest percentage of cooperative members.

A measure of the strength of individual cooperatives within markets may be observed by reviewing data on the percent of producers in a market belonging to the largest cooperative in the market. Data reflecting this measure are reported in Table 7.

In 7 of the 56 markets, all producers on the market belonged to the largest (and therefore only) cooperative in the market. At the other extreme, seven markets reported fewer than 30% of the market producers belonging to the largest cooperative in the market. The differential role of cooperatives in handling reserve milk supplies is substantiated in Table 8. In this table, differences in the proportions of non-Class I usage by cooperatives as of December 1974 are indicated. While cooperatives processed, transferred, and/or diverted about 65% of the non-Class I milk priced under Federal orders in December 1974, the proportions in individual markets ranged from less than 10% (five markets) to more than 90% (eight markets).

The differences between cooperatives and proprietary firms in handling reserve milk appear to be very closely related to the products being manufactured.

Cooperatives are usually the most important organizations in handling reserve milk supplies in markets where most of the reserve milk is utilized for butter and nonfat dry milk production.

Since cooperatives are an important institution in handling reserve milk, and since the handling of reserve milk can be a costly process, it has been observed that concessions should be made in the reserve price in order that cooperatives, and thus member producers, not be penalized in performing this essential market function. However, since all reserve milk in a market must finally be handled by some interest, the case for price concessions cannot be restricted to the cooperative's role in handling reserve milk. If there is to be a cost basis for adjusting the reserve milk price, all interests handling reserve milk, proprietary firms and cooperatives, should benefit equally from the price policy. Adjustments in reserve milk prices on this basis would not be predicated on whether the reserve milk was handled by choice or necessity.

TABLE 7.—Distribution of Federal Order Markets by Percent of Producers Belonging to Largest Cooperative in Market, December 1975.

Members of Largest Cooperatives (Percent)	No. of Federal Order Markets	Percent of Total Federal Order Milk Represented
100.0	7	1
90-99.9	7	6
80-89.9	5	3
70-79.9	8	6
60-69.9	9	20
50-59.9	6	9
40-49.9	5	20
30-39.9	2	8
Less than 30	7	27

TABLE 8.—Proportions of Non-Class I Usage Handled by Cooperatives, by Volume of Milk and Number of Markets, December 1974.

Percent of Other Than Class I Milk Manufactured, Transferred, or Diverted by Cooperatives	Volume of Milk	No. of Markets
	(mil. lb)	
More than 90	216.5	8
70-89.9	337.6	11
50-69.9	469.0	17
30-49.9	84.2	8
10-29.9	18.7	8
Less than 10	0.6	5
Total	1,126.8	57

The equity aspects of handling reserve milk may be more severe within a market than among markets. Within a market, one organization such as an operating cooperative may carry most of the responsibility for handling reserve milk. Meanwhile, other interests including bargaining associations, non-members, and proprietary firms may effectively incur neither responsibility nor cost in the reserve milk handling function. This issue does not get to the question of whether or not the same reserve milk price should be used in all markets. However, this equity problem in reserve milk pricing in the future will likely become more serious within markets than among markets because market consolidation will tend to create markets that have more similar characteristics, even while greater variation is generated within the organization of any particular market.

Multiple Reserve Milk Price Classes

The question of whether or not manufacturing use milk should be assigned to and priced in more than one price class according to use is often raised with respect to reserve milk pricing. Currently, in most Federal order markets, three price classes are applied to all milk. Reserve milk is normally equated with Class III milk. Products usually defined in Class III include "hard" cheese, butter, dry milk products, and evaporated and condensed milk. The large proportion of Class III milk used in the manufacture of butter, nonfat dry milk, and cheese limits most analysis of the surplus question to these three products. In this section, some of the issues involved in establishing a single reserve class price or separate reserve classes are examined.

During the early period of the Federal milk order program, there were variations among markets in: a) the number of use classes, b) the products in each class, and c) the prices for each use class. Over time, there was a gradual reduction in the number of use classes. By the end of 1957, less than one-fifth of the order markets had more than two use classes. In those markets with two classes, ice cream and cottage cheese as well as butter, nonfat dry milk, and cheese were in the lowest use class. During the early 1960's, the need developed for closer coordination and more uniformity of order provisions as the increased mobility of milk supplies caused local markets to gradually lose their identity. The merging of orders and the adoption of a uniform formula for moving Class I prices in all markets were two results of this development. It also impacted on the classification provisions in orders. The 39-market decision (March 6, 1974) establishing three classes for pricing (Class I for fluid products, Class II for the soft products regularly supplied from local milk supplies, and Class III for the remaining manufactured dairy products) reflects an apparent policy of USDA toward: a) a uniform number of use classes among markets, b) making the products in each class uniform among markets, c) making the price for each class uniform among markets, and d) a single use class for milk used to make butter, nonfat dry milk, and cheese.

Two objectives have been advanced for establishment of multiple manufacturing use classes for milk:

1. Total producer returns may be increased in situations where values of milk for different uses vary substantially from time to time; also, when all milk is Grade A and pooled, returns may be increased by more extended price classification.
2. Multiple classes for pricing of manufacturing use milk would avoid or reduce some of the pressures on regulated processors which are caused by fixing a single price for manufacturing use milk regardless of the net returns forthcoming in each use.

The extensive literature available on milk pricing does not focus on the question of defining more than one reserve class. In the 1962 Nourse Committee Report on the Federal order programs, the issue of the number of surplus classes was summarized as follows:

> "In considering the problem of the appropriate number of surplus classes to be used in the price structure for a local fluid milkshed, therefore, two questions must be answered. The first of these is, What is the nature of the demand for the alternative products for which the total milkshed supplied may be used? The second question becomes, Are these demands significantly different from each other?"[13]

There are no simple answers to questions raised about the number of reserve classes. In fact, USDA's Milk Pricing and Advisory Committee, which was established primarily to analyze alternative means for pricing Class I milk, observed that this issue was sufficiently complex to require a separate study.[14]

A 1969 study of the Minnesota-Wisconsin price series discussed some of the issues and problems of a single reserve vs. multiple reserve class prices in Federal order markets, but made no recommendation as to which would be preferred.[15]

Increasing Producer Returns with Multiple Reserve Classes

In order for multiple reserve classes to increase producer revenue, two conditions that must be met have been noted. "First, the reaction to changes in price must be different for the buyers of milk for one product than for buyers who use it for another product. Second, buyers of (milk for manufacturing uses) must not have available alternative sources of milk or the ingredients of milk."[16] Whether or not there are different reactions to price changes in the different uses is denoted by the elasticity of demand. If the demand elasticities for milk in each manufacturing use are different, then total revenue can be increased by setting prices at different levels for each use.

The impact of charging different prices for all milk used for cheese and for milk used for butter and

[13]Nourse, E. G., **et al.** April 1962. Report to the Secretary of Agriculture by the Federal Milk Order Study Committee. U. S. Dept. of Agr., Part II, Sec. 1.

[14]Knutson, Ronald D., **et al.** March 1973. Milk Pricing Policy and Procedures. U. S. Dept. of Agr., Part II, pp. 12, 59.

[15]Hammond, J. W. and T. F. Graf. May 1969. Study of Prices for Milk in Manufacturing Uses. Univ. of Minn., Agri. Exp Sta., Bull 497, pp. 23-24.

[16]Clarke, D. A., Jr. and Louis F. Herrmann. March 1961. Class III Milk in the New York Milkshed: VI—Economic Analysis of Class Pricing. AMS, U. S. Dept. of Agr., p. 50.

TABLE 9.—Estimated Impacts on Producer Returns of Fixing Different Prices for Milk Used in Cheese and Butter and Nonfat Dry Milk for 1974.

Prices for Milk Used in: Cheese	Prices for Milk Used in: Butter and Nonfat Dry Milk	Total Revenue Forthcoming at Each Price Combination	Average Return per cwt in Both Uses	Total Milk Use	Milk Used in: Cheese	Milk Used in: Butter and Nonfat Dry Milk	Farm Level Demand Elasticities for Milk in Each Use at Respective Prices and Quantities: Cheese	Farm Level Demand Elasticities for Milk in Each Use at Respective Prices and Quantities: Butter and Nonfat Dry Milk
$/cwt	$/cwt	bil. dollars	$/cwt	bil. lb	bil. lb	bil. lb		
7.15	7.15	3.22	7.15	45.1	25.8	19.3	—0.209	—0.827
7.50	7.01	3.29	7.29	45.1	25.5	19.6	—0.222	—0.809
8.00	6.88	3.39	7.53	45.1	25.2	19.9	—0.239	—0.772
8.50	6.70	3.47	7.69	45.1	24.8	20.3	—0.258	—0.737
9.00	6.52	3.55	7.87	45.1	24.4	20.7	—0.278	—0.703
16.70	3.92	4.15	9.19	45.1	18.6	26.5	—0.677	—0.330

nonfat dry milk is illustrated in Table 9. The first row of the table presents actual average 1974 prices paid for milk used in both enterprises, $7.15 per cwt. The estimated farm level demand for elasticities were —.209 for milk used in cheese and —.827 for milk used for butter and nonfat dry milk.[17] These coefficients indicate that charging different prices for milk in each use will increase total producer revenue. The succeeding rows in Table 9 show the impacts of successive increases in prices for milk in cheese and the corresponding price decline for milk used in the two enterprises in 1974. According to these calculations, the total producer returns could have been increased by $330 million by fixing the cheese milk price at $9.00 per cwt and the butter-powder milk price at $6.52 per cwt. In terms of blend price for milk in the two uses, the two prices would have yielded an average return of $7.87 per cwt for milk in manufacturing uses.

For the above price discrimination procedure to be workable, some kind of national pool would be needed for payment to producers. A national pooling mechanism would permit equitable distribution of the increased returns among producers regardless of the use made of their milk.

The preceding is an indication of how increased classification and price discrimination could increase producer returns for milk. Such a procedure results in a decrease in total consumer welfare and would certainly be opposed by consumers and their representatives. As a price support mechanism, however, it does have some appeal because average producer prices can be increased without government payments for subsidies or product purchases.

Differences in Net Returns Between Manufactured Dairy Products

The second argument for permitting multiple reserve class prices is that net returns, *i.e.*, the residual after substracting estimated costs of processing manufactured milk products, differ from plant to plant. Net returns may differ because the transport costs for finished products from processing plants to consuming markets differ according to location of the plants. However, the argument for multiple price classes is usually based on another characteristic of the manufacturing milk industry: Product prices for the different manufactured dairy products vary over time relative to one another and change the gross returns yielded from each hundredweight of milk. For given levels of processing costs, this

[17]Calculated from retail demand elasticities in Thraen, C. S., J. W. Hammond, and B. M. Buxton, 1976, An Analysis of Household Consumption of Dairy Products, Univ. of Minn., Agr. Exp. Sta., Bull. 515.

means that net returns per hundredweight of milk will differ according to whether a plant is producing cheese, or butter and powder, or other manufactured dairy products.

In a nonregulated market, competition in the long run forces all plants producing manufactured dairy products to pay similar prices for milk. However, in a short run situation where net returns to one product (*e.g.,* butter) increase relative to net returns to cheese, cheese plant operators are faced with a dilemma. Should they pay the same price as the butter-powder plants and hope that the situation quickly corrects itself, or should they pay what they can afford to pay and hope that producer loyalty will maintain business until the situation adjusts? If price imbalance persists, cheese plants would have to reduce their pay price, and receipts of producer milk likely would decrease. As producers shift their milk to butter-powder plants, product prices should eventually adjust so that net returns again become equal. The point is that plants in an unregulated market are not required to pay precisely the same price for milk as are plants subject to Federal order regulation.

In contrast to the assumptions of equilibrium models, processing plants do not always pay the same prices for milk in the absence of governmental controls. Several factors affect prices and are considered by the firm in establishing prices that are paid. First, not all plants are operating at the same level of efficiency, and therefore at the same level of processing costs. Transportation costs for the products to the consuming markets increase with distance from consuming markets. A recent study indicated that this results in generally declining milk prices in Minnesota and Wisconsin from the southeast regions to the northwest.[18] Pay prices of an individual plant are also affected by competition. A competing plant may be paying more because it is producing a product that currently yields a greater net return, or it may be a much more efficient plant. To obtain milk for operation, a given plant may therefore pay more than justified by its own processing costs.

The several factors affecting pay prices in nonregulated markets result in substantial variations in pay prices. For example, in June 1965, nonregulated dairy plant pay prices in Minnesota and Wisconsin ranged from $2.94 to $3.57 per cwt at 3.5% butterfat test. November prices for that year ranged from $2.95 to $3.65 per cwt.[19] In 1976, they ranged between $7.80 and $8.90 in June and $8.30 to $9.20 in August.

[18]Hammond, J. W. and T. F. Graf, **op. cit.,** p. 17.
[19]**Ibid,** p. 20.

With a single manufacturing milk price under Federal orders, all plants are required to pay the same price for manufacturing use milk regardless of the net return in each use. This means that plants may be paying more or less than the milk is worth. The amounts that the actual pay price for manufacturing use milk exceeded or fell short of estimated net returns in two uses are illustrated in the section on product price formulas (Tables 43 and 44 using the derived margins approach). During the 84-month period January 1971 to December 1977, the Minnesota-Wisconsin price (the manufacturing use price in all Federal orders) exceeded the estimated net returns to cheese production in 19 months and was less than the net return in 65 months. The maximum amount by which the net returns were exceeded by the M-W price was 30 cents per cwt. The maximum that net returns to cheese exceeded the M-W price was 50 cents per cwt.

The net returns to butter and powder production were exceeded by the M-W price in 38 of the 84 months, were greater in 44 of the months, and the same in 2 months. In 2 of the months, the M-W price exceeded the estimated net returns to butter-powder by more than $1.00 per cwt.

Obviously the requirement to pay a single price can impose a substantial cost on some plants. The fixing of separate prices that are more closely tied to the average returns for the use made of the milk is one way to deal with the problem. The problem is more serious with increased product specialization of handling of Federal order reserve milk. If facilities exist only to process one product, adjustments in use as relative product prices change are impossible. The degree of product specialization for selected Federal order markets was shown in Table 2. In those markets where there is substantial product specialization in the handling of reserve milk supplies, processors may find difficulty in reallocating reserve milk to different uses.

Multiple class pricing of reserve milk is complex in application. Arguments for multiple class pricing are strong. Yet there are a number of reasons for maintaining a single manufacturing use price. First, separate manufacturing use prices will not assure that all plants can afford the prices established by the regulation. The differences in ability to pay among plants making the same product may be as great as the differences associated with different products.

Second, when or if net returns do differ among products, it is desirable to encourage utilization of milk in those uses that result in the highest return to producers rather than providing a means to permit use in lower valued products. A single price provides this encouragement.

Shipping dock for reserve milk products at balancing plant.

Third, being forced to pay more for milk than it is worth is not unique to a regulated price system. When butter-powder and cheese prices are out of line, nonregulated plants making one of the products have to pay more than they can afford to compete for milk. "Over time, price disparities for various products either balance out due to interaction of supply and demand, or plants shift to alternative higher price products."[20] Thus, a single Federal order manufacturing milk price may not be placing plants under any undue hardships.

Based on the information developed in this report, it is not possible to advance a specific recommendation as to the number of reserve classes. That decision has to be formulated in the context of the several objectives of reserve milk pricing. As those objectives are reviewed, it is evident that a single reserve class can serve some of the purposes advantageously, while multiple reserve classes provide a better fit for other objectives. The performance afforded by a single reserve class in recent years generally has been positive. There have been short run stresses in periods when product prices were not in their normal relationship. However, a single reserve class has brought some self-correction to this problem over time as milk usage shifted to the higher value product.

Resolving the Multi-Market, Multi-Class Issues in Reserve Milk Pricing

The complex issues that emerge in reserve milk pricing relate to matters of: 1) whether different reserve milk prices might be established in different markets, 2) the number of reserve usage classes that might be defined, and 3) the level of reserve milk handling efficiency that should be reflected in the reserve class price. These issues cannot effectively be resolved by optimization procedures. A rigorous matching of each issue to the several objectives of reserve milk pricing is required to make the regulation decision that will result in the type of performance desired in reserve milk marketing.

The substantial rationale for adopting the same reserve price in all markets was noted previously. It should also be recognized that the U. S. Department of Agriculture has steadily moved in the direction of using the same reserve class price in all regulated markets. This movement was climaxed in early 1974 when the so-called "39 market classification" decision was issued. This decision basically adopted a three-price class program and established a uniform reserve class price for all affected markets. A review of that decision indicates the key factors that argued for the same reserve class price in all markets.[21]

1. Differences in reserve milk prices among interrelated markets cause inequities or competitive disparities among competing handlers of reserve milk.
2. Class III price adjustments that would attempt to reflect balancing costs in different markets would lead to a proliferation of different Class III prices that would aggravate the matter of establishing equal raw product costs.
3. Regulated handlers of reserve class milk should not be given an arbitrary advantage

[20] Similar points were presented in Hammond, J. W. and T. F. Graf, **Ibid**, pp. 23-24.

[21] Federal Register, March 7, 1964. 39:9016-9020.

over unregulated handlers of manufacturing grade milk, nor should they be put at a competitive disadvantage.

4. Implementation of lower reserve milk prices in some markets would mean that producers serving those markets would not be receiving a price for reserve milk equal to competitive prices paid for manufacturing grade milk.

The four factors are a direct application of most of the previously noted objectives of reserve milk pricing. However, at least for some markets, it is apparent that the objectives of: 1) maintaining adequate manufacturing outlets, and 2) pricing reserve milk at a market clearing level were de-emphasized relative to the other objectives.

Given the rationale for using the same reserve price in all markets and the tentative considerations relating to the number of reserve classes, the question remains as to what level of efficiency should be reflected in the reserve class price. Specifically, should the price permit a return to only the most efficiently regulated manufactured dairy product plants, to plants of average efficiency, or to the least efficient plants? Again, the answer can only be inferred from the several purposes of reserve milk pricing.

Among the pricing objectives cited early in this report, the maintenance of adequate manufacturing outlets, the availability of milk for the fluid market, the relationship to unregulated manufacturing milk prices, the resource allocation factor, and the equity objective all bear directly on the efficiency question. These several objectives taken together suggest that some "average level of efficiency" be recognized in defining the reserve milk price. Since the intensive production and processing area for manufactured dairy products is in the upper Midwest, and since the handling of reserve milk in other regions of the United States generally may be subject to more market stresses, the average level of efficiency in the upper Midwest is the appropriate reference point. As noted earlier, the market stresses or reserve handling costs in regulated markets are better handled on a fluid market service charge basis and not by arbitrary adjustments in the reserve milk price. In addition, a reserve price based on the average efficiency in the upper Midwest should offer some incentive for plants in other markets to attain greater efficiencies.

In summary, the combination of the same reserve class price in all markets, a single reserve usage class, and a recognized "average" efficiency level for establishing reserve milk prices have met the workability criterion on a longer run basis. Most of the objectives of reserve milk pricing have been served effectively in recent years by implementing policy along these lines. The basis for using the same reserve price in all markets is logical. The rationale for choosing a single reserve class and an average efficiency level is less precise, but the process has met most of the purposes of reserve pricing in most markets most of the time.

ALTERNATIVE MECHANISMS FOR RESERVE MILK PRICING

Given the eventual elimination of the Minnesota-Wisconsin competitive pay price series, what alternatives are available for pricing reserve milk in regulated markets? In this section, four possible alternatives and the pros and cons of each are considered. These alternatives are: 1) development of an alternative competitive pay price series for the situation when all milk is Grade A and pooled, 2) formulation of an approximate product price formula(s), 3) use of the public hearing process for direct establishment of reserve milk prices, and 4) adoption of an economic index procedure for moving reserve milk prices.

COMPETITIVE PAY PRICE

Over the history of public administration of producer milk pricing, some type of a competitive pay price series generally has been used to price reserve class milk. In recent years, in the Federal milk order program, the Minnesota-Wisconsin manufacturing grade milk price has become almost the exclusive basis for establishing monthly minimum prices for reserve (Class III) milk. With the projected disappearance of a competitive pay price as the volume of manufacturing grade milk diminishes, the question is raised as to how essential a competitive pay price series is to the future determination of milk prices. If a competitive pay price does indeed appear essential, then it is logical to analyze alternative means that might be implemented to retain a competitive pay price series.

A matter that requires emphasis in weighing the competitive pay price question concerns the relevance or necessity of a competitive pay price when substantial quantities of manufacturing grade milk continue to be marketed vs. the situation when conversion virtually has been completed and only Grade A milk is marketed. Part of the justification for using a competitive pay price series to price reserve class milk in the past relates to the necessity for price coordination of reserve supplies of Grade A milk with manufacturing grade milk. Another justification has been the difficulty and problem involved in developing realistic product price formulas.

The reasons for coordinating reserve class prices with manufacturing grade milk prices when significant volumes of manufacturing grade milk continue to be marketed are fairly obvious. In the situation where reserve Grade A prices are established lower than prices paid for manufacturing grade milk, unregulated manufacturing plants are placed at a competitive disadvantage relative to manufacturing plants in the pool.

The Federal milk order program has been sensitive to the matters of over-pricing and/or under-pricing reserve milk relative to unregulated manufacturing grade milk. Essentially, reserve milk pricing policy has been geared to providing for orderly disposition of excess supplies in the short run as well as for longer time periods. The immediate target has been to establish reserve milk prices at levels which will provide for the economic utilization of reserve milk in manufacturing outlets, *i.e.*, which will clear the market. In the longer run, the effort is made to establish prices at a level consistent with maintaining adequate manufacturing facilities for the handling of surplus milk in regulated markets. Up to this time, such a policy has required that excess Grade A milk be priced in close relationship to prices paid for manufacturing grade milk. On this basis, the use of a competitive pay price series to price reserve milk has been at least desirable and probably necessary. The fact that 19% of the milk marketed in the U. S. is still manufacturing grade milk indicates that these factors must be given serious consideration.

Much of the rationale for using a competitive pay price series to price reserve milk is that milk utilized in similar products, whether Grade A or Grade B, must be priced at essentially the same level. As long as manufacturing grade milk constitutes a significant portion of the market for milk used for manufactured dairy products, the "equal" price requirement should be recognized. However, the continuing conversion to Grade A milk production and marketing indicates that at some future point neither manufacturing grade milk nor the prices for it will be available, and the pricing of excess Grade A milk will not be constrained by manufacturing grade milk prices. Assuming that classified pricing plans will continue to be in effect in fluid milk markets, a new policy for pricing reserve milk must be defined and procedures for pricing reserve milk must be developed.

The primary *alternative* to pricing reserve milk by a competitive pay price series has been the use of product price formulas. Secondary alternatives, which have not been directly utilized but which need to be evaluated, include the public hearing process and the use of an economic index formula. Most of the pro and con arguments relative to the use of a competitive pay price series generally are set forth in terms of a partial comparison with product price formulas. In their 1969 milk price study,[22] Hammond and Graf offered the following supportive observations on competitive pay price formulas:

1. The average prices paid for manufacturing grade milk (unregulated plants) in areas of substantial competition for that milk provide a good measure of average value. Such prices reflect competitive values and are an average of prices actually reported paid.
2. Changes in plant processing costs, product values, and yields are directly and automatically reflected in the competitive prices paid by plants and therefore reflect the full value of milk used for manufactured dairy products.
3. A competitive pay price such as the Minnesota-Wisconsin price or the U. S. manufacturing grade price reflects the return for all products manufactured from milk, including minor by-products.
4. Since processing margins are automatically reflected in competitive pay prices, problems associated with maintaining accurate and up-to-date make allowance provisions as in product price formulas are avoided.
5. A competitive pay price series reflects overall manufacturing milk values. Therefore, in markets where facilities permit, milk is allocated to manufactured dairy products that have the highest value use (assuming that a single reserve price class is used in the market). In effect, the competitive pay price series provides a continuing incentive for needed resource adjustment.

On the negative side, six factors were noted:

1. Reported prices may differ from prices actually paid for various reasons, including errors in butterfat testing and milk weighing, incidence of hauling subsidies or various unreported premiums, and payment practices of cooperative plants being affected by dividends or patronage refunds.
2. Calculation of a competitive pay price series is somewhat more costly than the use of formula type prices.
3. Competitive pay price series are normally based upon prices reported paid at a sample of plants and may not be accurate if the sample is not representative. The weighing of the sample in terms of products may pose a particular problem if pay prices at one

[22]Hammond, J. W. and T. F. Graf, **op. cit.**, pp. 9-10.

type of plant differ substantially from pay prices at different product plants.

4. The level of efficiency of operations to which a competitive pay price series is geared may create problems. The M-W price, for example, is drawn from an area where milk production and processing of manufactured dairy products are probably conducted on a more efficient basis than is typical across the entire industry. Direct application of the price series outside of the manufacturing milk area implicity assumes a higher level of efficiency than prevails in the outside markets.
5. Because the competitive pay price for a given month is needed very early in the following month for price announcement purposes, the competitive pay price may have to be based in part on estimates and therefore may deviate from the actual average.
6. A competitive pay price series is not well suited to precisely reflect values of milk for different uses.

It is evident that factors arguing for retention of a competitive pay price series as long as substantial quantities of manufacturing grade milk continue to be marketed are fundamental. The question remains as to whether a competitive pay price series has such superior qualities that efforts should be made to continue providing such a price even as manufacturing grade milk disappears. An evaluation of the competitive pay price series indicates that the plus factors are quite formidable. At the same time, the minus factors reflect criticisms that point more to the mechanics of calculating the price and are less significant in their potential impacts. A reasonable conclusion is that the merits of a competitive pay price series are considerable and that, as a minimum, analysis should be directed to identifying alternative means of retaining competitive pay prices and to evaluating the potential performance of such prices.

To analyze the competitive pay price issue, an evaluation of the adequacy of the Minnesota-Wisconsin manufacturing grade milk price series is initially developed. It is anticipated that a viable M-W price series will continue to be available for several years. For the longer run, and assuming that manufacturing grade milk and unregulated Grade A milk will not be available, alternative means of retaining a competitive pay price series are analyzed.

Adequacy of the Minnesota-Wisconsin Price Series

The Minnesota-Wisconsin price series reflects free market pay prices for milk for manufacturing uses, as determined by competitive bidding among unregulated processors in Minnesota and Wisconsin —the two major manufacturing dairy product states. In theory, the M-W price represents national supply-demand conditions for manufactured dairy products, and indirectly for fluid products, since milk not used in fluid products "backs" into manufactured products. Manufacturing grade milk prices are measured from a base of 120 plants in Minnesota and 200 plants in Wisconsin. These plants purchased approximately 60% of all manufacturing grade milk sold in the two states. Monthly changes in prices from the base by 40 Minnesota plants and 70 Wisconsin plants determine monthly M-W series prices.

Close surveillance of the series is maintained by the USDA Statistical Reporting Service and the Dairy Division to assure continued reliability of the Minnesota-Wisconsin series. During the most recent 36-month period for which data are available (1974-76), estimated (announced) monthly Minnesota-Wisconsin prices averaged only 1.2 cents per cwt below final enumerated prices (Table 10).

A study directed at answering the criticism that the reported Minnesota-Wisconsin price overstated prices paid because of butterfat testing practices at dairy plants was made at the request of the USDA.[23] This study found some discrepancies between reported and actual milk prices of dairy plants. Overstatements of milk prices occurred because of understating butterfat tests by an average of 4.1 cents per cwt for 52 representative Minnesota and Wisconsin plants in 1967. Butterfat actually purchased by plants from the farmers exceeded butterfat reported to farmers for 50 of the 52 plants.

Hauling subsidies and cooperative refunds resulted in understatements of 1.4 cents and 2.1 cents per cwt, respectively, in reported cash prices for the two states combined.

On the average, reported prices paid by these 52 plants exceeded actual prices paid by only 0.6 cent per cwt. The M-W price series, therefore, closely approximates actual prices paid for manufacturing grade milk in the two states. Errors in butterfat testing reflected in the M-W series are largely offset by hauling subsidies and patronage refunds.

A question has been raised by some critics of the M-W series whether or not the M-W series can be influenced by individual dairies or organizations. The USDA review procedure makes this possibility highly unlikely. Prices reported by sample plants which are questionable are excluded if they cannot be verified. Also, sample plant price changes are evaluated in

[23]Hammond, J. W. and T. F. Graf, **op. cit.**, pp. 3-4.

TABLE 10.—Comparison of Minnesota-Wisconsin Manufacturing Grade Milk Price with Final Two-State Estimated Price for Milk of 3.5% Milkfat Content by Months, 1974-76.*

Year and Month	Minnesota-Wisconsin Series	Final Two-State Estimate	Difference Between Final Two-State and M-W Series
1974			
January	$8.10	$8.08	$—0.02
February	8.14	8.13	—0.01
March	8.15	8.13	—0.02
April	7.73	7.68	—0.05
May	6.93	6.78	—0.15
June	6.31	6.34	+0.03
July	6.29	6.27	—0.02
August	6.39	6.41	+0.02
September	6.69	6.70	+0.01
October	6.82	6.86	+0.04
November	6.76	6.76	0
December	6.41	6.46	+0.05
Simple Average - 1974	7.060	7.050	—0.010
1975			
January	6.80	6.75	—0.05
February	6.85	6.84	—0.01
March	6.86	6.87	+0.01
April	6.94	6.96	+0.02
May	7.02	7.05	+0.03
June	7.11	7.12	+0.01
July	7.35	7.37	+0.02
August	7.70	7.77	+0.07
September	8.27	8.34	+0.07
October	8.60	8.73	+0.13
November	8.84	8.91	+0.07
December	9.08	9.17	+0.09
Simple Average - 1975	7.618	7.657	+0.039
1976			
January	8.90	8.91	+0.01
February	8.25	8.26	+0.01
March	8.60	8.42	—0.18
April	8.44	8.42	—0.02
May	8.30	8.33	+0.03
June	8.32	8.39	+0.07
July	8.71	8.76	+0.05
August	8.99	9.00	+0.01
September	8.46	8.56	+0.10
October	8.26	8.31	+0.05
November	8.26	8.25	—0.01
December	8.25	8.22	—0.03
Simple Average - 1976	8.478	8.486	+0.008
36 Months	$7.719	$7.731	$+0.012

*Prices have been converted from the average milkfat test to 3.5% using the milkfat differential specified in Federal orders (Chicago Grade A butter x 0.120).

terms of changes from the base month in wholesale prices of manufactured dairy products and historical price and fat test relationships. Thus, no one firm or organization can hope to have much of an impact on the price.

A second factor relevant to possible rigging of the price by a group of plants in the series relates to the fact that the M-W price is used for both Class I and Class III pricing. For Class I purposes, cooperatives prefer to see the price as high as possible; on the other hand, they normally favor a Class III obligation as low as possible. Therefore, incentives for rigging conflict and create a situation where rigging is less likely to occur.

Another factor which could reduce the adequacy of the M-W series is Grade A subsidization of Grade B operations in dual intake plants. Factors other than the value of milk for manufacture would then be influencing the manufacturing grade milk price. A comparison of manufacturing grade milk prices paid at dual intake plants (Grade A and Grade B) and straight Grade B plants (Table 11) indicates "subsidization" does not occur. Minnesota Grade B plants paid as high or higher prices than dual intake plants in 11 of 12 months in both 1970 and 1973. Wisconsin Grade B plants outpaid dual intake plants all 12 months in 1970, and paid as high or higher in 7 out of 12 months in 1973.

One other feature of the M-W price, as well as any other competitive pay price series, that needs to be recognized is that it is an average price and that a substantial range in actual pay prices exists among reporting plants. For example, in June, July, and August 1976, the M-W price adjusted to a 3.5% butterfat basis was announced as follows:

June 1976	\$8.32 per cwt
July 1976	8.71 per cwt
August 1976	8.99 per cwt

For the 3-month period, the range in prices paid by manufacturing grade milk plants in Minnesota and Wisconsin was more than \$1.10 in June and August, and more than \$0.90 in July.

For the month of June (\$8.32 M-W price), approximately 24% of the cheese plants had pay prices in the \$8.20 to \$8.40 range. Similar proportions of cheese plants had pay prices of ± 10 cents from the average in July and August. Obviously, about three-fourths of the cheese plants were more than 10 cents higher or lower than the reported M-W price.

Approximately 30% of the butter plants and slightly more than 50% of the varied plants had pay prices in a plus/minus 10 cent range from the M-W price for the 3-month period. Again, substantial numbers of plants had pay prices that were more than 10 cents per cwt different from the announced M-W price. For the mid-1976 period, the data show that most of the cheese plants paid above the average for all plants, and most of the butter plants paid below the average for all plants.

The range in plant pay prices in a competitive pay price series such as the M-W price needs to be recognized and monitored. Among the factors that

TABLE 11.—Milk Sold to Plants, Manufacturing Grade (Price), Minnesota and Wisconsin Average Price Received by Farmers per 100 Lb (Adjusted to 3.5% B. F. Basis) by Kind of Plant, Monthly, 1970 and 1973.*†

	Minnesota				Wisconsin			
	1970		1973		1970		1973	
	Grade B Plants	Dual Intake Plants	Grade B Plants	Dual Intake Plants	Grade B Plants	Dual Intake Plants	Grade B Plants	Dual Intake Plants
	Dollars per cwt							
January	4.49	4.47	5.34	5.35	4.70	4.62	5.59	5.57
February	4.48	4.44	5.40	5.40	4.62	4.60	5.60	5.60
March	4.43	4.39	5.45	5.44	4.61	4.57	5.72	5.72
April	4.52	4.49	5.50	5.45	4.61	4.55	5.76	5.77
May	4.54	4.53	5.56	5.54	4.60	4.54	5.79	5.80
June	4.58	4.57	5.60	5.52	4.61	4.53	5.81	5.82
July	4.61	4.59	5.77	5.75	4.64	4.58	5.94	5.94
August	4.60	4.59	6.50	6.47	4.66	4.55	6.46	6.48
September	4.58	4.56	7.05	7.05	4.63	4.55	7.06	7.07
October	4.59	4.56	7.40	7.40	4.70	4.68	7.53	7.51
November	4.63	4.62	7.61	7.54	4.73	4.72	7.86	7.82
December	4.68	4.69	7.79	7.78	4.77	4.75	8.10	8.01

*Prices at average test have been converted to a 3.5% basis using a butterfat differential per point (0.1%) that is calculated by multiplying the average price of Grade A (92 score) butter at Chicago by 0.120. This is the method specified in Federal milk orders.

†For 1970, the tabulations include all plants receiving any Grade B milk in both states. For 1973, the tabulations for Minnesota include all plants receiving any Grade B milk; for Wisconsin the tabulations include only those plants reporting receipts on a monthly basis but those plants accounted for about 75% of the manufacturing grade milk produced in the state.

explain the range are product and location. In reserve milk pricing, particularly with respect to the issues of what level of efficiency to gear the price level and whether or not separate reserve product classes should be defined, an evaluation of the factors associated with the lower prices and the higher prices in the monthly range of competitive pay prices becomes necessary when reserve milk pricing procedures are analyzed relative to the objectives of reserve milk pricing.

Although the M-W series has served as an appropriate and adequate price base in the past, it has not been free of problems. Some of the more important ones are described in the following paragraphs.

Pay Price Differences Between Creameries and Cheese Factories

The Minnesota-Wisconsin price series can be analyzed to differentiate between the value of milk for butter-powder and the value of milk for cheese. For example, from 1969 through 1973, M-W series prices consistently exceeded M-W creamery pay prices and consistently were less than M-W cheese pay prices. Price variations reached +10 cents per cwt in the M-W creamery spread and —10 cents in the M-W cheese spread (Tables 12 and 13). The differences have been less since 1973.

The Minnesota-Wisconsin series reflects *average* net values of *various* products, which may differ substantially from net values of individual products. Furthermore, the net value of individual products relative to the pay series may change over time—sometimes exceeding and other times lagging the competitive pay price series.

The Minnesota-Wisconsin price series reflects the value of milk utilized in the mix of dairy products produced in the area for which the pay prices are gathered. This product mix for the M-W pay price series (or for other series which might be constructed) may differ materially from the mix of products produced from reserve milk in a particular order market. If this occurs, serious financial problems may result for plants having class price obligations based on product mixes that differ substantially from their own. For example, the M-W price is heavily weighted by cheese values, with 86% of the 1976 product weight in the major state, Wisconsin, assigned to cheese and only 3% to butter (Table 14). For the two states, Minnesota and Wisconsin combined, cheese had a weight of close to 70% in the M-W series. Also, in 1976 less than 45% of U. S. milk used for manufactured dairy products was used for cheese. In 1976, Federal order markets also were using slightly more reserve milk in cheese than in butter. In 3 of 33 selected Federal order markets, three-

TABLE 12.—Amount by Which the Minnesota-Wisconsin Price Exceeded the Minnesota-Wisconsin Creamery Pay Price (3.5% B. F.).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average	Absolute Average*
							Dollars per cwt							
1961	0.05	(0.01)	(0.01)	(0.05)	(0.05)	(0.05)	(0.04)	(0.03)	(0.03)	0.02	(0.04)	(0.04)	(0.02)	0.03
1962	(0.04)	(0.04)	(0.06)	(0.02)	(0.06)	(0.05)	(0.03)	(0.02)	(0.02)	(0.01)	0.01	0.02	(0.02)	0.03
1963			(0.01)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)				(0.01)	0.01
1964			(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	0.01	0.02	0.02		0.04		0.01
1965	0.04	0.02	0.02	0.02	0.01	(0.01)	(0.01)	(0.01)	(0.01)	0.01	0.02	0.05	0.01	0.02
1966	0.09	0.08	0.13	0.06	0.02	0.09	(0.06)	0.03	0.03	0.13	0.04	0.07	0.06	0.07
1967	0.05	0.01	0.01	0.01	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)	(0.01)	0.01	0.05		0.02
1968	0.02	0.02	0.03	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.01)	0.01	(0.01)	0.02
1969		(0.03)	0.01	0.04	0.05	0.04	0.06	0.05	0.05	0.11	0.11	0.11	0.05	0.06
1970	0.15	0.12	0.10	0.05	0.03	0.06	0.02	0.04	0.04	0.09	0.09	0.05	0.07	0.07
1971	0.02	0.01	0.09	0.09	0.03	0.02	0.02	0.02	0.06	0.03	0.03	0.06	0.04	0.04
1972	0.11	0.10	0.09	0.03	0.06	0.05	0.12	0.15	0.12	0.14	0.13	0.11	0.10	0.10
1973	0.09	0.10	0.11	0.09	0.08	0.12	0.07	0.01	(0.01)	0.31	0.14	0.13	0.10	0.10
1974	0.09	0.07	0.08	(0.10)	0.09	(0.05)	(0.03)	(0.03)	0.05	0.03	(0.04)	(0.09)	0.01	0.06
1975	(0.05)	(0.06)	0.04	0.02	0.07	0.10	0.05	0.08	0.03	(0.03)	(0.08)	0.03	0.02	0.05
1976	0.02	(0.04)	0.10		(0.03)	(0.08)	(0.03)	0.07	(0.02)	0.03	0.06	0.06	0.01	0.04
1977	0.01	0.01	0.01	0.03	0.02	0.04	0.04		0.04	0.02	0.01	0.01	0.03	0.02

*Average ignoring signs.

TABLE 13.—Amount by Which the Minnesota-Wisconsin Price Exceeded the Minnesota-Wisconsin American Cheese Plant Price (3.5% B. F.).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average	Absolute Average*
							Dollars per cwt							
1961	(0.12)	0.01	0.02	0.03	0.06	0.05	0.07	0.06	0.04	0.01	0.01	0.03	0.03	0.04
1962	0.03	0.07	0.10	0.04	0.01	0.02	0.01	0.05	0.03	(0.04)	(0.04)	(0.04)	0.03	0.04
1963	(0.05)	(0.04)	(0.03)	(0.02)	(0.03)	(0.01)	(0.01)	(0.01)	(0.02)	(0.05)	(0.07)	(0.07)	(0.03)	0.03
1964	(0.05)	(0.05)	0.02	0.03	0.03	0.02	0.04	0.01	(0.03)	(0.07)	(0.07)	(0.09)	(0.02)	0.04
1965	(0.03)	(0.01)	(0.01)	0.01	0.03	0.03	0.03	0.03	0.01	(0.04)	(0.10)	(0.17)	(0.02)	0.04
1966	(0.21)	(0.21)	(0.21)	(0.08)	(0.08)	(0.06)	(0.08)	(0.05)	(0.02)	(0.06)	(0.06)	(0.03)	(0.10)	0.10
1967	(0.02)	0.05	0.06	0.05	0.04	0.05	0.06	0.06	0.04	0.03	0.03	0.02	0.04	0.04
1968	(0.05)		0.04	0.03	0.01	0.04	0.07	0.06	0.01	0.01	(0.02)	(0.02)	0.02	0.03
1969	0.01	(0.03)	(0.06)	(0.06)	(0.07)	(0.08)	(0.06)	(0.07)	(0.09)	(0.11)	(0.14)	(0.18)	(0.08)	0.08
1970	(0.17)	(0.12)	(0.11)	(0.04)	(0.05)	(0.02)	(0.02)	(0.08)	(0.05)	(0.10)	(0.11)	(0.11)	(0.08)	0.08
1971	(0.05)	(0.03)	(0.09)	(0.02)	(0.04)	(0.04)	(0.02)	(0.03)	0.01	(0.03)	(0.06)	(0.08)	(0.04)	0.04
1972	(0.07)	(0.11)	(0.07)	(0.04)	(0.04)	(0.05)	(0.06)	(0.04)	(0.06)	(0.12)	(0.07)	(0.08)	(0.07)	0.07
1973	(0.11)	(0.10)	(0.10)	(0.09)	(0.10)	(0.07)	(0.06)	(0.03)	(0.08)	(0.05)	(0.14)	(0.09)	(0.08)	0.08
1974	(0.08)	(0.10)	(0.11)	(0.07)	0.03	(0.02)	0.01	(0.03)	(0.05)	(0.10)	0.01	0	(0.04)	0.05
1975	(0.01)		(0.04)	(0.07)	(0.05)	(0.09)	(0.05)	(0.03)	(0.02)	(0.04)	0.01	(0.02)	(0.03)	0.04
1976	(0.08)	(0.08)	0.03	(0.12)	(0.04)	(0.09)	(0.08)	(0.10)	(0.11)	(0.09)	(0.04)	(0.04)	(0.07)	0.08
1977	(0.02)	(0.07)	(0.04)	0.01	(0.02)		(0.02)	(0.04)	(0.06)	(0.01)	(0.11)	(0.07)	(0.03)	0.04

*Average ignoring signs.

TABLE 14.—Product Weights in the Minnesota-Wisconsin Price Series, 1976.

	Wisconsin	Minnesota	Average for Minnesota and Wisconsin
Butter	3	30	15
Cheese	86	50	70
Varied Products	11	20	15

fourths or more of reserve milk was used in producing butter. Thus, cheese had a far heavier weight in the M-W series than the proportionate use of milk for cheese in either Federal order markets or in the United States as a whole.

Since cheese returned a higher farm pay price than butter-powder in all 8 years, 1969-76 (Tables 12 and 13), regulated butter-powder plants were obviously disadvantaged relative to cheese plants with the M-W series price in effect.

Selection of Competitive Pay Price

A number of different competitive price series could be developed for Federal order reserve milk pricing including the Minnesota price, the Wisconsin price, the Minnesota-Wisconsin price combined, or the U. S. average price. Each would yield somewhat different prices. For many years the M-W series prices have exceeded U. S. manufacturing pay prices, with price variations reaching +20 cents per cwt in the M-W—U. S. spread (Table 15). Substantial variation also exists between the M-W series and Wisconsin and Minnesota manufacturing milk prices, with the M-W price averaging as much as 10 cents per cwt annually less than Wisconsin and 14 cents per cwt more than Minnesota since 1970 (Tables 16 and 17). The Wisconsin manufacturing price averaged 19 cents per cwt more than the Minnesota manufacturing price during 1970-75, and the differential has been widening rather than narrowing (Table 18).

These differences between U. S., Minnesota, and Wisconsin manufacturing milk pay prices raise questions about using composite M-W prices for reserve milk in either Wisconsin or Minnesota, much less in the entire country. However, there are plausible reasons for the price differences among the several series. The U. S. manufacturing milk price series reflects prices from a larger area and from areas where price-making is less competitive; the differences between the Minnesota and Wisconsin manufacturing milk prices are explained partly by the product differences between the two states.

In utilizing a competitive pay price series for reserve milk pricing in regulated markets, two criteria are important: 1) the price should be generated from a market where the essential elements of a competitive

TABLE 15.—Amount by Which the Minnesota-Wisconsin Price Exceeded the U. S. Manufacturing Grade Price (3.5% B. F.).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average	Absolute Average*
							Dollars per cwt							
1961	0.07	0.04	0.04	0.04	0.07	0.07	0.10	0.12	0.13	0.11	0.10	0.08	0.08	0.08
1962	0.07	0.08	0.09	0.06	0.05	0.06	0.07	0.09	0.09	0.08	0.07	0.05	0.07	0.07
1963	0.04	0.04	0.03	0.03	0.04	0.05	0.06	0.07	0.06	0.05	0.02	0.01	0.04	0.04
1964	0.02	0.02	0.03	0.04	0.05	0.05	0.06	0.06	0.10	0.08	0.05	0.05	0.05	0.05
1965	0.05	0.03	0.05	0.07	0.08	0.06	0.08	0.09	0.09	0.08	0.06	0.05	0.07	0.07
1966	0.01	0.04	0.06	0.05	0.04	0.11	0.08	0.14	0.17	0.14	0.08	0.09	0.08	0.08
1967	0.08	0.06	0.08	0.09	0.07	0.07	0.07	0.08	0.10	0.08	0.09	0.09	0.08	0.08
1968	0.07	0.08	0.08	0.08	0.08	0.09	0.09	0.11	0.11	0.12	0.08	0.10	0.09	0.09
1969	0.08	0.05	0.07	0.11	0.11	0.10	0.12	0.12	0.14	0.16	0.16	0.11	0.11	0.11
1970	0.08	0.07	0.07	0.08	0.06	0.13	0.08	0.07	0.09	0.13	0.13	0.07	0.09	0.09
1971	0.07	0.11	0.08	0.13	0.08	0.09	0.10	0.10	0.15	0.10	0.09	0.10	0.10	0.10
1972	0.10	0.08	0.12	0.08	0.08	0.10	0.13	0.20	0.15	0.16	0.21	0.20	0.14	0.13
1973	0.16	0.14	0.14	0.16	0.14	0.18	0.16	0.20	0.22	0.34	0.27	0.27	0.20	0.20
1974	0.23	0.16	0.16	0.04	0.07	(0.07)	(0.01)	(0.04)	0.03	0.01	(0.08)	(0.08)	0.03	0.08
1975	0.02			0.02	0.06	0.08	0.14	0.15	0.23	0.18	0.20	0.19	0.11	0.11
1976	0.11		0.23	0.07	0.08	0.03	0.12	0.16	(0.05)	0.01	0.05	0.06	0.07	0.08
1977	0.03	0.01	0.05	0.08	0.08	0.07	0.07	0.05	0.08	0.08	0.05	0.10	0.07	0.06

*Average ignoring signs.

TABLE 16.—Amount by Which the Minnesota-Wisconsin Price Exceeded the Wisconsin Manufacturing Milk Price (3.5% B. F.).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average	Absolute Average*
							Dollars per cwt							
1961	(0.08)	(0.01)	(0.02)	0.01	0.03	0.01	0.02	0.03	0.03	0	0.02	0.02	0.01	0.02
1962	0	0.04	0.06	0.01	0.01	0.01	0.03	0.03	0.02	0.01	0.01	(0.01)	0.02	0.02
1963	(0.01)	(0.02)	(0.01)	(0.01)	0	0	0	0	0	(0.01)	(0.03)	(0.04)	(0.01)	0.01
1964	(0.02)	(0.03)	0.01	0.02	0.01	0.01	0.01	0.02	(0.02)	(0.03)	(0.04)	(0.04)	(0.01)	0.02
1965	(0.03)	(0.02)	(0.02)	0	0.01	0	0.03	0.01	0	0	(0.04)	(0.09)	(0.01)	0.02
1966	(0.13)	(0.15)	(0.17)	(0.09)	(0.07)	(0.04)	(0.07)	(0.05)	(0.02)	(0.03)	(0.05)	(0.05)	(0.08)	0.08
1967	(0.02)	0.01	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.01	0.01	0	0.01	0.02
1968	(0.04)	0	0.01	0.02	0.01	0	0.01	0.03	0.01	0	(0.01)	0	0	0.01
1969	0	(0.02)	(0.06)	(0.03)	(0.05)	(0.07)	(0.04)	(0.05)	(0.08)	(0.09)	(0.12)	(0.14)	(0.06)	0.06
1970	(0.19)	(0.13)	(0.13)	(0.07)	(0.07)	(0.05)	(0.05)	(0.05)	(0.07)	(0.12)	(0.11)	(0.12)	(0.10)	0.10
1971	(0.10)	(0.03)	(0.10)	(0.03)	(0.05)	(0.06)	(0.03)	(0.05)	(0.02)	(0.06)	(0.08)	(0.12)	(0.06)	0.06
1972	(0.10)	(0.12)	(0.09)	(0.09)	(0.08)	(0.08)	(0.09)	(0.09)	(0.11)	(0.25)	(0.02)	(0.11)	(0.10)	0.10
1973	(0.12)	(0.12)	(0.12)	(0.12)	(0.14)	(0.08)	(0.10)	(0.07)	(0.11)	0.02	(0.12)	(0.19)	(0.10)	0.11
1974	(0.11)	(0.15)	(0.17)	(0.13)	0.03	(0.04)	0	(0.05)	(0.13)	(0.19)	(0.06)	(0.06)	(0.09)	0.09
1975	(0.02)	(0.03)	(0.07)	(0.10)	(0.07)	(0.12)	(0.11)	(0.13)	(0.13)	(0.13)	(0.07)	(0.05)	(0.08)	0.09
1976	(0.09)	(0.15)		(0.19)	(0.12)	(0.18)	(0.15)	(0.16)	(0.24)	(0.17)	(0.12)	(0.11)	(0.14)	0.14
1977	(0.11)	(0.14)	(0.15)	(0.10)	(0.07	(0.01)	(0.04)	(0.09)	(0.11)	(0.08)	(0.17)	(0.14)	(0.10)	0.10

*Average ignoring signs.

TABLE 17.—Amount by Which the Minnesota-Wisconsin Price Exceeded the Minnesota Manufacturing Milk Price (3.5% B. F.).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average	Absolute Average*
							Dollars per cwt							
1961	0.10	0	(0.01)	(0.06)	(0.06)	(0.06)	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.02)	0.04
1962	(0.05	(0.05)	(0.05)	(0.03)	(0.05)	(0.05)	(0.03)	(0.02)	(0.02)	(0.01)	0.01	0.01	(0.03)	0.03
1963	0	0.01	0	(0.02)	(0.02)	0	(0.01)	0	0	0.01	0.02	0.01	0	0.01
1964	0.02	0.02	0.01	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	0.02	0.02	(0.01)	0.06	0	0.02
1965	0.06	0.02	0.02	0.03	0.01	(0.02)	0	(0.02)	(0.01)	0.02	0.03	0.06	0.02	0.02
1966	0.12	0.16	0.18	0.10	0.04	0.06	(0.08)	0.04	0.02	0.10	0.07	0.07	0.09	0.09
1967	0.04	0	0	(0.01)	(0.02)	(0.02)	(0.02)	(0.03)	(0.04)	(0.04)	(0.02)	0	(0.01)	0.02
1968	0.02	0.02	0.01	(0.05)	(0.02)	(0.03)	(0.06)	(0.04)	(0.04)	(0.02)	0.01	0.01	(0.02)	0.03
1969	0.02	(0.03)	0.03	0.04	0.05	0.05	0.09	0.07	0.08	0.10	0.15	0.12	0.06	0.07
1970	0.14	0.14	0.15	0.08	0.04	0.06	0.04	0.03	0.05	0.11	0.11	0.07	0.08	0.08
1971	0.06	0.05	0.06	0.09	0.07	0.06	0.03	0.06	0.07	0.06	0.07	0.08	0.06	0.06
1972	0.13	0.10	0.13	0.05	0.08	0.10	0.16	0.17	0.17	0.05	0.34	0.15	0.14	0.14
1973	0.11	0.11	0.13	0.15	0.15	0.16	0.14	0.07	0	0.13	0.14	0.22	0.13	0.13
1974	0.16	0.18	0.20	0.05	0.12	(0.01)	0.06	0.02	0.17	0.16	0.06	0	0.10	0.10
1975	0.08	0.01	0.09	0.09	0.08	0.10	0.12	0.20	0.19	0.12	0.12	0.10	0.11	0.11
1976	0.07	0.06	0.23	0.13	0.14	0.15	0.16	0.17	0.05	0.12	0.16	0.14	0.13	0.13
1977	0.13	0.13	0.15	0.14	0.07	0.02	0.06	0.06	0.08	0.09	0.08	0.08	0.10	0.09

*Average ignoring signs.

market prevail; and 2) since reserve milk is utilized for a wide range of manufactured dairy products, the competitive pay price series should be influenced by the product volumes among the several uses. The Minnesota-Wisconsin series meets these criteria more than other competitive pay price series. Even so, no single price series can provide a panacea to the several problems associated with reserve milk pricing.

Influence of Grade A Blend Prices on Competitive Pay Prices

If a competitive pay price is to accurately reflect the value of milk for manufacturing, it must reflect the value of products made from the reserve milk, rather than the influence of outside price enhancement or price diminishing factors. In this context, the question of influence, or lack of influence, of Grade A fluid prices on manufacturing milk prices naturally arises. Although there are some exceptions, evidence indicates that areas with high fluid prices generally have higher manufacturing prices than areas with low fluid prices, and vice versa. For example, in 1976 both Minnesota and Wisconsin manufacturing milk prices tended to be highest in areas where fluid prices were highest, and lowest in areas where order blend prices were lowest (Table 19).

Wisconsin's highest Grade A fluid prices were in the Southern districts, and manufacturing milk prices in that area were also highest in the state. Wisconsin's lowest fluid prices were in the Northwest and West Central districts, which also had the lowest manufacturing milk prices.

Similarly, Minnesota's highest fluid price was in the Southeast district, which had a higher manufacturing milk price than all but one district. Minnesota's lowest fluid price district was the North Central district, which also had the lowest manufacturing milk price.

When fluid prices are high relative to manufacturing milk prices, pressures build on manufacturing plants to increase their pay prices. When fluid prices are low relative to manufacturing milk prices, there is less pressure for increases in manufacturing prices. Low differentials between fluid and manufacturing prices also discourage Grade A conversion.

Differing Values of Butterfat in Butter and Cheese

In pricing reserve milk, the M-W price at 3.5% butterfat is adjusted up or down by a differential based on the Chicago Grade A butter price times 12%. The adjustment on milk used to make butter is the same as that used to make cheese. This procedure fails to adequately reflect the value of higher testing milk used for cheese.

TABLE 18.—Manufacturing Grade Milk Pay Prices, per cwt, 1966-1977, 3.5% Butterfat Test.

Year	Wisconsin Manufacturing Grade Milk Prices			Minnesota Manufacturing Grade Milk Prices			Wisconsin Manufacturing Grade Milk Prices Exceed Minnesota Manufacturing Grade Milk Prices		
	All	Creameries	Cheese Plants	All	Creameries	Cheese Plants	All	Creameries	Cheese Plants
				Dollars per cwt, 3.5% milk					
1966	$4.00	$3.90	$4.02	$3.85	$3.83	$3.96	+$0.15	+$0.07	+$0.06
1967	3.98	3.98	3.94	4.01	4.00	4.07	— 0.03	— 0.02	— 0.13
1968	4.17	4.19	4.14	4.19	4.17	4.26	— 0.02	+ 0.02	— 0.12
1969	4.48	4.42	4.50	4.36	4.33	4.49	+ 0.12	+ 0.09	+ 0.01
1970	4.75	4.68	4.75	4.58	4.53	4.68	+ 0.17	+ 0.15	+ 0.07
1971	4.87	4.84	4.87	4.75	4.73	4.80	+ 0.12	+ 0.11	+ 0.07
1972	5.18	5.08	5.19	4.94	4.90	4.99	+ 0.24	+ 0.18	+ 0.20
1973	6.40	6.27	6.42	6.17	6.14	6.24	+ 0.23	+ 0.13	+ 0.18
1974	7.15	7.18	7.13	6.96	6.96	7.00	+ 0.19	+ 0.22	+ 0.13
1975	7.70	7.72	7.70	7.51	7.51	7.53	+ 0.19	+ 0.21	+ 0.17
1976	8.61	8.61	8.61	8.35	8.32	8.38	+ 0.26	+ 0.29	+ 0.23
1977	8.67	8.63	8.67	8.48	8.46	8.49	+ 0.19	+ 0.17	+ 0.18
Average									
1966-70	4.27	4.23	4.27	4.20	4.17	4.29	+ 0.07	— 0.06	— 0.02
1971-77	6.94	6.90	6.94	6.74	6.72	6.78	+ 0.20	+ 0.18	+ 0.16
1966-77	5.83	5.79	5.83	5.68	5.66	5.74	+ 0.15	+ 0.13	+ 0.09

TABLE 19.—Comparison of Average Grade A Fluid and Manufacturing Grade Milk Prices per cwt, 3.5% Butterfat Test, Minnesota and Wisconsin, 1976.*

Crop Reporting District	Wisconsin			Minnesota†		
	Fluid Price	Manufacturing Grade Price	Difference	Fluid Price	Manufacturing Grade Price	Difference
S.E.	$9.16	$8.65	$0.51	$9.10	$8.36	$0.74
N.E.	9.08	8.61	0.47	‡	‡	
S.C.	9.13	8.73	0.40	8.97	8.35	0.62
N.C.	9.02	8.64	0.38	8.74	8.06	0.68
S.W.	9.14	8.56	0.58	8.88	8.42	0.46
E.C.	9.07	8.72	0.35	8.99	8.27	0.72
C.	9.07	8.55	0.52	8.83	8.36	0.43
W.C.	8.99	8.52	0.47	8.83	8.34	0.42
N.W.	8.95	8.50	0.45	8.77	8.07	0.70

*Butterfat differentials used for Wisconsin and Minnesota fluid milk and Wisconsin manufacturing milk price conversions to 3.5% butterfat test were 10.6¢ per point (the average annual 1976 Chicago Order 30 differential), and 10.2¢ per point for Minnesota manufacturing milk.
†July 1976 - June 1977 prices (after Federal milk order merger).
‡Too few to report.

As a general relationship, milk testing higher in protein (specifically casein) means higher cheese yields. Since there is a positive average relationship between the fat test and the protein test in producer milk, higher fat levels in milk are associated with higher protein tests and higher cheese yields.

It is useful to use an example to illustrate the higher implicit value that accrues to butterfat in cheese as compared to butterfat in butter through the price standardization procedure. The assumption is made that wholesale butter and cheese prices are $1.01 and 98 cents per lb, respectively (approximate CCC purchase prices for the 1977-78 marketing year). Further, a fat test of 3.7% butterfat is used in this example. Finally, the standard Van Slyke cheese yield table indicates that 3.5% milk normally yields 9.74 lb (39% moisture), while 3.7% milk yields 10.21 lb of cheese.

Wholesale butter at $1.01 per lb generates a 12.1 cent butterfat differential. Therefore, if the Minnesota-Wisconsin price at 3.5% test is $8.80 per cwt, the 3.7% price is $9.04. The additional 2 points of fat, or 24 cents per cwt higher price, is associated with an additional 0.47 lb of cheese (10.21 lb minus 9.74 lb). With the price of cheese at 98 cents a lb, the higher yield from 3.7% milk adds 46 cents (98 cents x 0.47) to the gross return. Therefore, the apparent margin from the higher testing milk is 22 cents per cwt greater (46 cents minus 24 cents) than the apparent margin associated with milk testing 3.5% butterfat. A comparable situation occurs to a much lesser degree in milk used for butter-powder because of the normally higher powder yield in higher testing milk.

Essentially, as the butterfat test of milk increases, a handler's gross return from making cheese increases more than does the price paid for the milk, and the apparent margin widens. The mechanical procedure of adjusting pay prices from announced 3.5% prices to the higher average test of milk used to make cheese fails to recognize the additional value provided cheese processors from higher value milk. This is because the principal milk solid that butter contains is butterfat, and the entire price standardization procedure is geared to the value of butterfat as measured by butter. With single component pricing, *i.e.,* butterfat, the value of milk used in products such as cheese in which yields are influenced by the solids-not-fat content of milk as well as the milkfat is not fully reflected through a butterfat differential alone. As long as milk prices are established on a cwt-butterfat basis and the price is standardized only on the basis of butterfat, any pricing formula will be subject to the apparent inconsistency of different butterfat values in different products. Some type of a multiple component pricing plan would be required to help correct this situation.

Converting the Minnesota-Wisconsin Price at Average Butterfat Test to 3.5%

In appraising the M-W price series as a mover of manufacturing values, the question emerges as to whether the procedure prescribed in Federal orders for converting the M-W price at average test to 3.5% provides a butterfat differential which is representative of the average of butterfat differentials at manufacturing grade milk plants in the two states.

The Economics, Statistics, and Cooperative Service provides a monthly estimate of the M-W price at the average butterfat test. This price is converted to 3.5% using the butterfat differential specified in Federal milk orders (Chicago Grade A butter x 0.120). If the butterfat differential calculated according to this procedure corresponds closely with the average differential in the two states, it is reasonable to conclude that it is appropriate to use this differential for converting prices at test to a 3.5% butterfat basis.

Prior to 1975, differentials specified in Federal orders for converting the M-W to 3.5% and the average two-state differentials appeared to be in close relationship. Data reported in Table 20 indicate that in 1974 differentials used to convert the M-W price and average two-state differentials both averaged 7.9 cents per point. Beginning in August 1974, however, the order differential used for converting the M-W price has been above the average two-state differential and the spread between the two has been widening. In 1975, the differential used in converting the M-W price averaged 9.3 cents per point, 0.8 cent per point more than the average two-state differential of 8.5 cents. In 1976, the differential used in converting the M-W price averaged 1.2 cents per point higher, and for the period April-August 1977, the differential was 1.7 cents per point higher each month.

Since most Federal orders use a factor of 0.115 in adjusting producer prices, the 0.115 factor might be considered as a possible alternative that would bring the differential used to convert the M-W to 3.5% in line with the average two-state differential. Using a factor of 0.115 instead of 0.120 in calculating the differential would have narrowed the difference from 0.8 to 0.4 cent per point in 1975, from 1.2 cents to 0.7 cent in 1976, and from 1.7 to 1.2 cents per point in April through August 1977 (Table 20).

The widening of the difference between the differential used to convert the price to 3.5% and the average two-state butterfat differential indicates that no single factor could be relied on to provide a representative order differential for more than a short period of time.

TABLE 20.—Comparison of the Average Butterfat Differential for Manufacturing Grade Milk in Minnesota and Wisconsin with Differentials Calculated Using the Chicago Grade A Butter Price Times 0.120 and 0.115.

Year	Average Butterfat Differential in Minnesota and Wisconsin	Calculated Differential: Chicago Grade A Butter Price Times 0.120: Differential	Calculated Differential: Chicago Grade A Butter Price Times 0.120: Exceeds Average Differential in Minn. and Wis.	Calculated Differential: Chicago Grade A Butter Price Times 0.115: Differential	Calculated Differential: Chicago Grade A Butter Price Times 0.115: Exceeds Average Differential in Minn. and Wis.
	Cents per Point				
1974					
January	8.4	8.2	—0.2	7.9	—0.5
February	8.2	7.7	—0.5	7.4	—0.8
March	8.2	8.2	0	7.8	—0.4
April	8.0	8.2	0.2	7.8	—0.2
May	7.8	7.3	—0.5	7.0	—0.8
June	7.7	7.3	—0.4	7.0	—0.7
July	7.6	7.3	—0.3	7.0	—0.6
August	7.8	8.0	0.2	7.7	—0.1
September	7.8	8.2	0.4	7.8	0
October	7.9	8.3	0.4	7.9	0
November	7.9	8.3	0.4	7.9	0
December	7.8	7.8	0	7.5	—0.3
Average	7.9	7.9	0	7.6	—0.3
1975					
January	7.8	8.0	0.2	7.7	—0.1
February	7.8	8.2	0.4	7.8	0.0
March	7.9	8.2	0.3	7.8	—0.1
April	7.9	8.3	0.4	8.0	0.1
May	7.8	8.3	0.5	8.0	0.2
June	7.8	8.3	0.5	8.0	0.2
July	8.1	9.2	0.3	8.8	0.7
August	8.7	10.0	0.3	9.6	0.9
September	9.2	10.5	1.3	10.1	0.9
October	9.5	11.2	1.7	10.7	1.2
November	10.7	11.7	1.0	11.2	0.5
December	10.3	12.4	2.1	11.9	1.6
Average	8.5	9.3	0.8	8.9	0.4
1976					
January	9.5	10.3	0.8	9.9	0.4
February	9.2	9.7	0.5	9.3	0.1
March	9.4	10.3	0.9	9.9	0.5
April	9.7	10.7	1.0	10.3	0.6
May	9.7	10.8	1.1	10.3	0.6
June	10.0	11.4	1.4	10.9	0.9
July	10.6	12.7	2.1	12.2	1.6
August	10.7	12.7	2.0	12.2	1.5
September	10.2	11.1	0.9	10.6	0.4
October	9.9	10.9	1.0	10.4	0.5
November	9.8	10.9	1.1	10.4	0.6
December	9.7	10.9	1.2	10.4	0.7
Average	9.8	11.0	1.2	10.5	0.7
1977					
January	9.8	10.9	1.1	10.4	0.6
February	9.8	10.9	1.1	10.4	0.6
March	10.0	11.1	1.1	10.7	0.7
April	10.3	12.0	1.7	11.5	1.2
May	10.4	12.1	1.7	11.6	1.2
June	10.4	12.1	1.7	11.6	1.2
July	10.4	12.1	1.7	11.6	1.2
August	10.4	12.1	1.7	11.6	1.2

TABLE 21.—**Comparison of the Minnesota-Wisconsin Price Adjusted to 3.5% by the Average Butterfat Differential for Manufacturing Grade Milk in Minnesota and Wisconsin with the M-W Adjusted to 3.5% Using the Butterfat Differential Specified in Federal Orders.**

	Minnesota-Wisconsin Price Adjusted to 3.5% Using		
Year	Average Butterfat Differential in Minnesota and Wisconsin	Butterfat Differential Specified in Federal Orders*	Amount M-W Adjusted by Average Differential in Minn. and Wis. Exceeds M-W as Adjusted in Federal Orders
	Dollars per cwt		
1974			
January	8.10	8.10	0
February	8.13	8.14	—0.01
March	8.15	8.15	0
April	7.73	7.73	0
May	6.93	6.93	0
June	6.31	6.31	0
July	6.29	6.29	0
August	6.40	6.39	0.01
September	6.70	6.69	0.01
October	6.83	6.82	0.01
November	6.77	6.76	0.01
December	6.41	6.41	0
Average	7.06	7.06	0
1975			
January	6.80	6.80	0
February	6.86	6.85	0.01
March	6.87	6.86	0.01
April	6.95	6.94	0.01
May	7.03	7.02	0.01
June	7.12	7.11	0.01
July	7.36	7.35	0.01
August	7.71	7.70	0.01
September	8.30	8.27	0.03
October	8.66	8.60	0.06
November	8.87	8.84	0.03
December	9.13	9.08	0.05
Average	7.64	7.62	0.02
1976			
January	8.92	8.90	0.02
February	8.25	8.25	0
March	8.61	8.60	0.01
April	8.45	8.44	0.01
May	8.31	8.30	0.01
June	8.33	8.32	0.01
July	8.72	8.71	0.01
August	9.01	8.99	0.02
September	8.48	8.46	0.02
October	8.28	8.26	0.02
November	8.30	8.26	0.04
December	8.29	8.25	0.04
Average	8.50	8.48	0.02
1977			
January	8.22	8.19	0.03
February	8.18	8.16	0.02
March	8.33	8.31	0.02
April	8.63	8.60	0.03
May	8.65	8.62	0.03
June	8.61	8.60	0.01
July	8.66	8.65	0.01
August	8.66	8.64	0.02

*Chicago Grade A butter price x 0.120.

Converting the M-W price at average test to 3.5% using a butterfat differential which is higher than the manufacturing grade butterfat differential in the two states results in a 3.5% price lower than it would be if the average two-state differential was used. In order to observe how much the 3.5% price is lowered by a higher fat differential, the M-W price at average test was converted to 3.5% using the average of the Minnesota and Wisconsin manufacturing grade milk butterfat differentials. The resulting prices were then compared to the announced prices converted to 3.5% by a differential calculated by multiplying the monthly Chicago Grade A butter price by 0.120 (Table 21). A comparison of the two sets of prices reveals the following:

- In 1974 the two sets of prices averaged the same. In 1975, 1976, and during the first 8 months of 1977, 3.5% prices adjusted by the present method understated 3.5% prices adjusted by the average two-state differential by an average of 2 cents per cwt.
- During the 44-month period January 1974-August 1977, prices adjusted by the present method understated prices adjusted by the average two-state differential by 1 cent per cwt in 18 months and by 2 cents in 7 months. The two prices were the same in 9 months. The largest difference was 6 cents and this only occurred during 1 month, October 1975.
- The largest understatement from using the present method can be expected in the fall months when the average butterfat tests are at their peak.

While using the present method for converting the M-W price has not and may not result in a significant understatement of the price at 3.5%, the fact remains that a butterfat differential obtained by multiplying the monthly Chicago Grade A butter price by 0.120 no longer is representative of the average two-state differential. It may be appropriate, therefore, to consider the procedure for converting the M-W price to 3.5% as an item on the agenda to be considered the next time a general hearing on milk pricing is held.

RETAINING A COMPETITIVE PAY PRICE SERIES WITH A MANUFACTURING MILK ORDER

While reserve milk pricing in regulated markets historically has been related to competitive pay prices through a formula mechanism, the concept of letting reserve milk prices directly find their own competitive level (within a regulated market) has at least been recognized. In a 1961 study of Class III pricing in the New York milkshed, Clarke and Herrman commented as follows: "With certain assumptions about the effectiveness of competition, by far the simplest solution would be to permit Class III prices to find their own level . . . Prices for milk considered to be in the pool but in excess of Class I and Class II requirements would be negotiated between individual buyers and sellers . . . these negotiations might tend to establish a uniform price consistent with the competitive price for all pool milk used for manufacturing in the market . . . "[24]

Since that 1961 study, the steady conversion trend toward an all Grade A supply has drawn some attention to possibilities for retaining competitive pay prices in the absence of manufacturing grade milk. The usual assumption has been that as conversion to one grade of milk becomes an accomplished fact, and that as the converted milk becomes pooled in the Federal market order program, competitive pay pricing for manufacturing use milk will no longer be possible. There will not be any Grade B manufacturing grade milk available for competitive pricing. Nevertheless, large volumes of butter, cheese, nonfat dry milk, and other manufactured dairy products will continue to be processed, but from Grade A milk which is in market order pools. The upper Midwest will continue to be the dominant production-processing area for manufactured dairy products. Manufactured dairy products will continue to be produced in many specialized manufacturing plants and by many competing firms in the upper Midwest. Given these observations, the question is whether a competitive pay price series can continue to exist when all milk converts to Grade A with pooling of the converted milk in market orders. In this section, an alternative which could retain a competitive pay price series in the upper Midwest is examined.

One means of retaining a competitive pay price is to simply exempt some manufacturing use milk (Class III) from minimum pricing provisions. This suspension of the minimum price requirement on Class III milk could be limited to plants engaged exclusively in making Class III products. No performance requirement in terms of pool plant qualifications would be required of these plants. In effect, an additional designation of a pool plant beyond that of a distributing plant, supply plant, or cooperative handler would be established. Exempt plants under this plan would be pooled under what is defined as the Midwest Manufacturing Milk Order. In all likelihood, pool plant qualifications in this order, as well as others, would not be needed as all milk becomes pooled, except as a means of identifying the pool to which milk is assigned. Some call provisions may be

[24]Clarke, D. A., Jr. and Louis F. Herrmann, **op. cit.**, pp. 46-47.

necessary in order to assure availability of milk for Class I uses.

As a result of the exemption of Class III milk minimum pricing, processors of manufactured dairy products in this order would make decisions as to what to pay for milk for manufacturing in the same way that pay price decisions on manufacturing grade milk are currently made. A pay price series based on the prices paid at these plants could be computed for use in Class III pricing in all other Federal order markets. It could also lead to a manufacturing milk price that clears the market of all milk forthcoming at that price.

In order to evaluate the key elements of such a proposal, an example is useful. Initially, assume that all the milk in the Midwest is pooled under two orders, the Upper Midwest Fluid Milk Order and the Midwest Manufacturing Milk Order. For analytical purposes, it is assumed that the two orders pool all of the milk in Minnesota and Wisconsin and milk from surrounding states that is currently pooled in the Chicago and Upper Midwest Federal Orders. An approximation of such volumes on the two markets can be made by combining the milk in the present Chicago Regional and Upper Midwest Federal Order Markets according to their 1976 producer receipts, plus the non-regulated 1976 marketings of Grade B milk in Minnesota and Wisconsin. For 1976, the volumes and use were as follows:

Market	Producer Deliveries in Thousands of Pounds	Class I Sales	Class II Sales (Soft Products)
Chicago Regional Order	9,779,003	3,115,330	1,120,408
Upper Midwest Order	5,336,370	1,507,625	254,905
Wisconsin Grade B	6,909,000		
Minnesota Grade B	4,865,400		
Total Upper Midwest Markets	26,889,773*	4,622,955	1,375,313

*Undoubtedly some additional manufacturing milk from North and South Dakota would be included.

As the data indicate, the Upper Midwest market as defined would have about 17% Class I utilization. Assuming three price classes in the markets, the total annual assignment of milk to Class III would account for about 78% of total use, or about 20.9 billion lb of milk for Class III products. The 20.9 billion lb of Class III is substantially greater than the current marketing of Grade B manufacturing milk in Minnesota and Wisconsin.

It is also assumed that about three-fourths of the 20.9 billion lb of Class III milk is received at plants exclusively or primarily engaged in manufacturing Class III products. Thus, about 15.7 billion lb would be under the Midwest Manufacturing Milk Order. The remaining 5.2 billion lb would be pooled with the Class I and II milk of the current Chicago Regional and Upper Midwest orders in the combined Upper Midwest Fluid Milk Order.

The manufacturing milk order without minimum Class III pricing permits the development of competitive price series for a much larger volume of milk than is currently included in the Minnesota-Wisconsin price series. As a result, a legitimate pay price series would be available for various uses, including direct adoption as the Class III price in all other Federal order markets.

One complex question relates to how the manufacturing milk order would be administered to fulfill the objectives of the Federal milk order program if the milk in the pool is not subject to minimum pricing. To make such a system operative, some adjustment in usual Federal order procedures would be required. A paramount concern is the payment of producers shipping milk to plants in the regulated manufacturing order—those plants not subject to minimum pricing. If these producers receive only the competitive manufacturing use price, there would be no incentive to ship milk to these plants. Obviously some kind of equalization payment to producers in addition to plant pay price under the manufacturing order would be required to bring their prices in line with producer prices in the fluid markets. Thus, gross return per hundredweight of milk for each producer would be composed of two payments. First would be the pay price of the plant to which each producer sold his milk. This price would be determined as usual by product pay prices, processing costs, and the competition facing each plant. Undoubtedly different plant pay prices would prevail. This is similar to the current situation for manufacturing plants in the upper Midwest. Second, the producers shipping to exempt Class III plants would receive an equalization payment from the market administrator of the market manufacturing order which has been assessed against fluid milk markets. As a result, these producers would receive a blended share of Class I sales in the same way that all producers in fluid milk orders are compensated. However, the producers of the so-called exempt plants in the manufacturing order need not receive the minimum blend price as defined in existing fluid milk orders.

Equalization rates could be calculated as the difference between an equalization price for the market order and blend price in the Upper Midwest Fluid Milk Order. The equalization payment would need to be a fixed amount, regardless of the plant to which a producer shipped his milk or the price paid by that plant. If equalization payments depended on the plant's pay price, plants that would pay low prices for milk used in Class III purposes would draw more heavily from the pool and would have a direct incentive to pay low prices.

It would be necessary to assure that large numbers of producers in the Midwest Manufacturing Milk Order do not receive a higher total return per hundredweight than the blend price of producers shipping to plants in the Upper Midwest Fluid Milk Order. This could be accomplished by making the Class III equalization price higher than the average competitive pay price at exempt plants. The average competitive pay price would be used for establishing the Class III prices for all other Federal order markets. This average price would be directly comparable to the present Minnesota-Wisconsin price. The Class III equalization price would be used only for administering the pool of the Midwest Manufacturing Milk Order. It could be based on prices at or near the top of each month's range of competitive pay prices. For example, assume that in a given month the calculated average price paid by the exempt plants of the manufacturing order is $9.00 per cwt. It may be calculated from a distribution of plant prices for 320 plants as the current Minnesota-Wisconsin price. The range could be as follows:

	Price Paid per cwt	No. of Plants
	$9.60	4
	9.40	12
	9.20	93
	9.00	102
	8.80	93
	8.60	12
	8.40	4
Average:	$9.00	320

In order to determine an equalization price from this type of a price distribution, it could be provided, for example, that the equalization price would be the average price paid by the high 5% of plants in the series. From the example, the high 5% or 16 plants in the series averaged $9.45 in the pay price. Therefore, $9.45 would be the equalization price. If the blend price for the Upper Midwest Fluid Milk Order for the month happened to be $9.75, an equalization payment of 30 cents per cwt would be paid by the Manufacturing Order Market Administrator to all producers selling milk to the "exempt" plants.

Specification of the equalization price at or near the high end of the range of competitive pay prices would accomplish two things. First, it would avoid major price misalignment between the fluid and manufacturing prices that would cause difficulty in retaining producers in the fluid orders and obtaining milk for fluid uses. If the equalization price was at the midpoint of prices reported in the competitive pay series, for example, the equalization payment would be higher; about half the producers under the manufacturing order would be receiving a higher price than producers in the Midwest Fluid Milk Order. Use of an equalization price at the high end of the range of competitive pay prices would limit this problem. In the example, producers at the four plants paying $9.60 per cwt would be getting a price 15 cents more than the fluid market blend ($9.90 as opposed to $9.75), but the incidence and the magnitude of this difference is limited and would avoid any significant problems.

Second, specification of the equalization price at or near the high end of the range of competitive pay prices would not interfere nor influence the decision making on prices by the exempt plants. Market forces and plant operations would continue to be the key factors in making monthly price decisions. The fixed equalization payment out of the market administrator's office would not affect price differences. Plants reporting pay prices at the high end of the range would continue to see their producers enjoying a slight price advantage. Similarly, plants reporting pay prices at the low end of the range would continue to see their producers having a price disadvantage. Knowledge that an equalization price would come out of the competitive pay price series for a given month should not alter factors relevant to decision making on price at any plant if a number of plants are competing for milk supplies.

A second important question about the proposed manufacturing milk order concerns the source of the equalization fund. At first glance, one might argue that the source of funds should be the Upper Midwest Fluid Milk Order. The basis of the argument is that the current Chicago or Upper Midwest orders which would make up that market are those on which converted Grade B manufacturing milk is currently pooled. However, there are at least three reasons why some broader base of assessment is necessary:

1. Classified prices that raise fluid prices in any market of the U. S. above those which would prevail without the regulation have a de-

pressing effect on manufacturing milk prices, although total revenue to the dairy industry is increased. Thus, producers who sell in markets with only manufacturing use milk should participate in the increased returns generated from classified pricing.

2. The funds required for the equalization payment are substantial and could not be borne by one Federal order fluid market, even a very large one.
3. Since plants in the manufacturing order could provide potential reserves for all fluid markets, it is reasonable to observe that a standby assessment from most or all regulated markets be made for the availability of standby reserves.

To illustrate the assessments on a narrow and broad basis, the milk volumes indicated previously for Upper Midwest Fluid Milk Order and the Midwest Manufacturing Milk Order are noted. The class uses are based on the 1976 utilization of milk in the Chicago and Upper Midwest orders. Assume the $9.00 per cwt average price in the manufacturing order.

For the Midwest Manufacturing Milk Order:
Producer receipts are 15.7 billion lb
Utilization of producer milk is:

Class III	15.7 billion lb

Equalization price $9.45 per cwt

For the Upper Midwest Fluid Milk Order:
Producers receipts are 11.2 billion lb
Utilization of producer milk is:

Class I	4.6 billion lb
Class II	1.4 billion lb
Class III	5.2 billion lb

Class prices are:

Class I	$10.80 per cwt
Class II	9.10 per cwt
Class III	9.00 per cwt

Blend price is $9.75 per cwt

The equalization payment to producers in the Midwest Manufacturing Order as calculated earlier is 30 cents per cwt—the difference between the equalization price of the manufacturing order and the blend price of the Upper Midwest Fluid Milk Order. In order to provide the amount of funds from the Upper Midwest Fluid Milk Order, 42 cents per cwt would need to be deducted from the blend price in that order. The net price to producers in that order would fall from $9.75 to $9.33 per cwt. This is now lower than the average return to producers in the manufacturing order. If, however, funds for equalization were collected from all fluid milk orders, the deduction would be 6.8 cents per cwt based on 1976 Federal order deliveries. The net return to producers in the Upper Midwest Fluid Milk Order would fall to $9.68 per cwt. It appears that the broader basis of assessment is necessary.

Collection of funds from all other Federal order markets for distribution in the manufacturing order market bears some similarity to the current reserve (standby) pool that is privately administered outside the Federal order program. That program collects monies in several fluid milk orders and then distributes the funds to manufacturing plants in the upper Midwest which receive Grade A milk. The standby plants agree to ship fluid grade milk into the order markets only upon call by the standby pool. The above proposal differs from the standby pool in that a much larger volume of milk would be contributing funds and a much larger number of producers would be receiving payments.

The proposed manufacturing milk order is also different than past proposals for manufacturing grade milk orders. In such earlier proposals, the focus of the regulatory process concerned such matters as check weighing, testing, and market information. Establishment of minimum prices for milk was usually not included in discussions of a manufacturing milk order. Under this plan, price reporting to the manufacturing milk order administrator by each plant is a primary function.

The grade or quality of milk is not a particular issue in this proposal. In the long run, complete conversion to Grade A is assumed; therefore, the manufacturing pool would relate only to Grade A milk. In the more immediate time period or transition period, the milk eligible for inclusion in the reserve pool would likely include manufacturing grade milk as well as such Grade A milk currently being identified in the voluntary standby pool. The main argument for including both Grade B and Grade A milk in the manufacturing pool during the transition period would be to broaden the base on which the competitive price series is generated.

The order would also be defined in terms of production area—not market area—and production would overlap some of the market areas of the existing fluid milk markets. At the onset the manufacturing pool would include (or regulate) plants in three different categories. These would be:

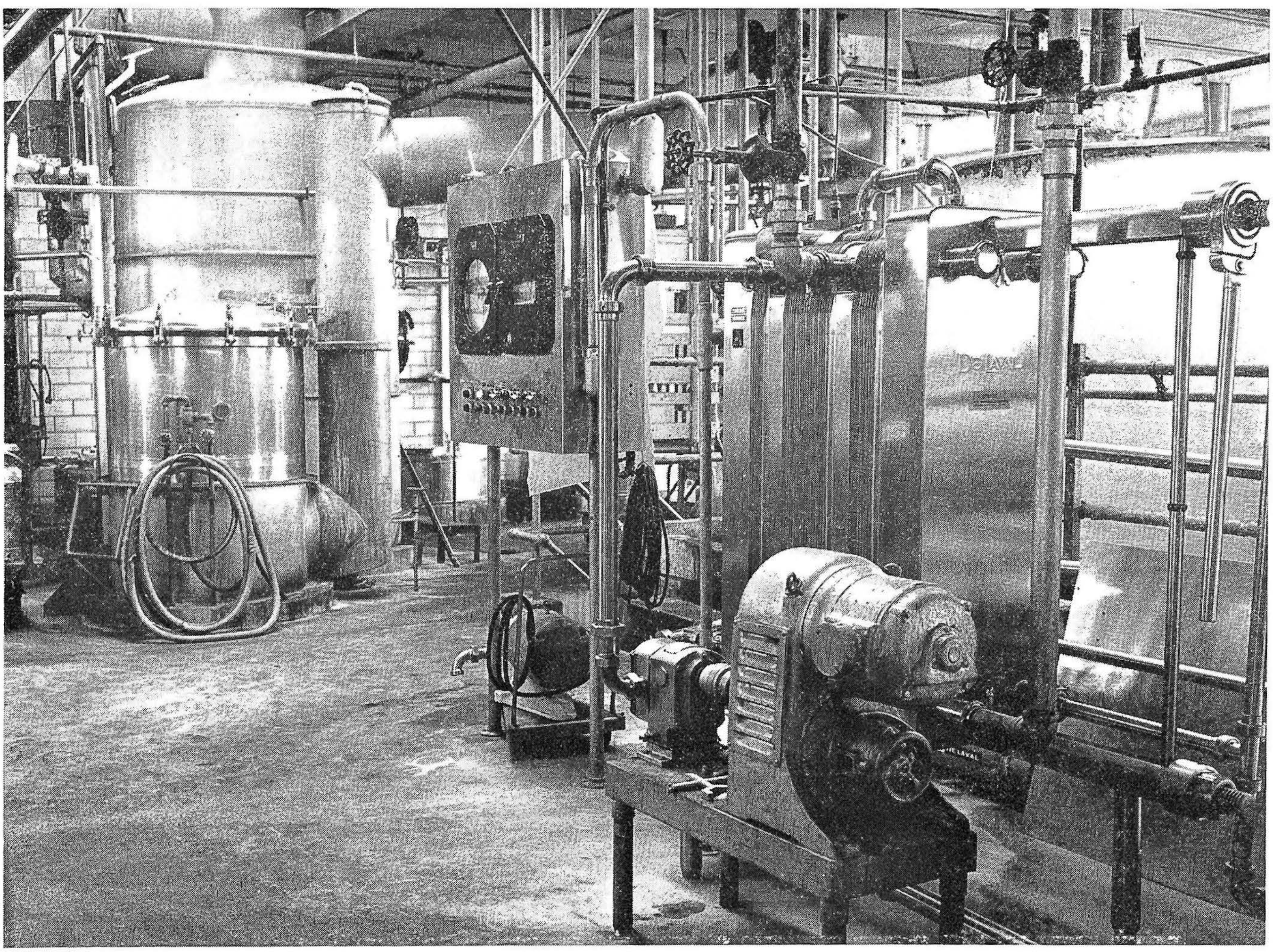
1. All Grade B plants in Minnesota and Wisconsin.
2. Any unregulated Grade A plants in Minnesota and Wisconsin that are engaged only in manufactured dairy products.
3. Surplus plants (supply plants) currently regulated in Federal orders in Minnesota and Wisconsin (possibly some firms in North and South Dakota) which would opt

to participate in the manufacturing order rather than the fluid milk order.

Different possibilities exist with respect to such plants. Plant performance requirements could be tightened somewhat in the Upper Midwest Fluid Milk Order so that the manufacturing order would be the preferred choice for some of the plants.

Obviously, with an estimated 15.7 billion lb of milk participating in the manufacturing order, several hundred plants may be subject to its regulation (both the number of plants and the volume of milk might be different depending on what criteria are finally adopted for defining participation in the manufacturing order). It is likely that the plants would operate in a manner similar to that of plants currently buying manufacturing grade milk in Minnesota and Wisconsin. A necessary requirement of plants is that their pay prices be reported monthly to the manufacturing milk order administrator and that the procedures finally adopted for estimating a competitive price series receive the full cooperation of the plant personnel.

The entire proposal for Class III suspension is conceptual and has been advanced for further evaluation. A number of basic institutional, legal, and operational questions can be directed at the concept. For example, in the initial stage, should there be a differential equalization rate for Grade B and Grade A producers? For multi-plant firms that have plants under both the manufacturing order and fluid order, will the pricing policies or decisions for manufacturing milk be significantly affected by the equalization payment to producers? Is there any inherent characteristic of the proposal that forces the pay prices in the manufacturing order to depart from a market clearing price for milk used in manufacturing dairy products? Some of the questions may be answered by additional economic analysis; others may only be answered through actual application of the proposed program.



Pump, pasteurizing unit, and part of vacuum pan used to condense reserve milk for spray drying.

PRODUCT PRICE FORMULAS FOR RESERVE MILK PRICING

Product-price formulas were used in a number of Federal order markets in the 1940's and 1950's to price reserve milk. Reserve milk prices were determined by multiplying product prices for either cheese, or butter and nonfat dry milk, by yield estimates and subtracting allowances for processing costs. Product price formulas permit developing estimates of the average value of milk in specific uses, particularly butter-powder and cheese. They may more closely approximate what plant operators can afford to pay in the short run for specific uses—as contrasted to competitive pay prices, which are indicative of what plants have paid. Butter-powder and cheese formulas can be used separately, or combined by assigning weights to the butter-powder and cheese formulas, to get a combined butter-powder cheese formula.

Product price formulas require representative measures for product prices, yields, and make allowances. It also is necessary to have the various measures internally consistent. For example, if the price for 40-lb blocks of standard moisture cheese is used, the yield factor and the cost factor must also relate to 40-lb blocks of standard moisture cheese.

Obtaining representative information as to product yields is difficult because of variation of fat and nonfat solids content of milk received. Only rarely do plant receipts average 3.5% butterfat. Although plants generally have records on overrun for butterfat and powder yields per hundredweight of skim milk or buttermilk dried, the data generally are not reported.

Similarly "clean" data on product prices and costs are difficult to come by.

These difficulties are frequently cited as reasons why it is hard to develop realistic product price formulas. In spite of these difficulties, product price formulas can be developed which reflect average prices paid for manufacturing milk in Minnesota and Wisconsin. This is possible because:

a. The M-W price itself is a reflection of a wide spectrum of products manufactured, prices received for products, yields, costs, etc.
b. Wholesale prices used for butter and cheese reflect changes in prices received for these products.
c. Yield information can be derived through a combination of plant information and theoretical yields, and can be converted to 3.5% butterfat basis so as to be representative of standard yields.

A close relationship has existed between changes in product prices and changes in manufacturing milk prices. Analysis of monthly data for the period January 1971 through January 1975 indicates that 99.4% of the changes in the M-W price during the 4½ years were associated with variations in the price of butter, nonfat dry milk and cheese, 99.3% with variations in cheese prices, and 86.1% with variations in butter and nonfat dry milk prices. These results indicate that a product price formula, properly constructed, would not drastically change the underlying current basis for pricing reserve milk in Federal orders.

DATA NEEDS FOR PRODUCT PRICE FORMULAS

Data needs for each of the three essential ingredients in product price formulas—product prices, processing costs, and product yields—are discussed in following sections.

Product Prices

Product prices used in product price formulas should reflect as accurately as possible what plants are actually receiving for manufactured dairy products. At present the trade sells cheese largely on the basis of the Green Bay National Cheese Exchange price, butter on the basis of Chicago or New York Mercantile Exchange prices, and nonfat dry milk on the basis of various measures including USDA Market News quotations.

Butter and Cheese Exchange Quotations. Trading on the National Cheese Exchange and the Mercantile Exchanges is limited to a few minutes on Friday mornings. These prices, adjusted with premiums and discounts for product characteristics, are the basis on which most cheese and butter is sold by manufacturing plants and assemblers during the following week.

Questions have been raised as to whether these exchange prices are accurate and whether the exchanges any longer perform a useful function. There is special concern over the small volume of trading. Trading on the National Cheese Exchange and on the Mercantile Exchanges has always been thin. For example, in 1975 sales on the butter exchange were less than 0.1% of production, and sales on the cheese exchange were less than 0.5% of production. However, trades are not normally made for merchandising, but instead are made primarily when product traders feel price adjustments are needed to reflect supply-demand conditions. The trade generally indicates that prices resulting from exchange trading are reflective of market conditions. There is confirmation of this opinion in that exchange prices are used extensively as the basis for buying and selling butter and cheese.

Market News Quotations. The Dairy Market News Service of the USDA assembles and reports various dairy product price series. These include:

1) Chicago and New York area wholesale butter prices, 2) Central States production area nonfat dry milk prices, and 3) Wisconsin assembly point cheddar cheese prices.

The wholesale butter price is based on reports of wholesale selling prices for bulk butter at Chicago and New York. The level of open market trading in bulk butter in these markets has been very low in recent years, since large volumes of bulk butter are no longer moved into the city for printing and trading, but instead go directly from country processing points to retailers or other users. Prices reported on the wholesale market are based on limited trading, and much of the trading represents sales to users such as candy manufacturers, bakeries, and food processors. On numerous occasions, market news reporters, because of the lack of trading, have reported a nominal price based on the normal differential which has prevailed between the spot market and the wholesale selling price, or have used CCC purchase prices when CCC is buying butter.

The low level of trading of bulk butter on the Chicago wholesale market is of concern since this price is used in computing butterfat differentials in all Federal order markets. A monthly average butter price which is incorrect by just 1 cent could result in an increase or decrease in aggregate values of milk to producers by more than $500,000. Ideally, a more broadly based, weighted average f.o.b. plant price for bulk butter obtained on a monthly basis, similar to the information presently obtained by the USDA for nonfat dry milk, would generate more confidence in the reported price.

The volume of transactions involved in the Wisconsin assembly point cheese price is substantial as compared to the very thin market in which wholesale selling prices for butter are based. Information reported covers open market transactions for 20 to 25 of the major assemblers of cheese in Wisconsin. Wisconsin represents nearly 50% of the U. S. production of cheddar cheese. A large portion of the open market transactions in barrel and 40-lb block cheese is covered by the Wisconsin assembly point cheese price reports. Here again, however, the volume of open market transactions represents only a limited portion of total cheese marketed in Wisconsin. A range of prices is reported, but no information is reported as to relative volumes sold at different prices.

The price measure for nonfat dry milk which is used in Federal milk orders is a weighted average selling price reported to the Economics, Statistics, and Cooperative Service of USDA for spray process nonfat dry milk, f.o.b. plants located in the Chicago area, *i.e.*, in Iowa, Michigan, Minnesota, and Wisconsin. Although there is some variation in the number of plants reporting from month to month, prices in this series represent about 25% of the total U. S. production of spray process nonfat dry milk.

Trade Reaction to Price Quotations. Seven major Wisconsin processors and wholesalers of manufactured dairy products were interviewed to determine use of the different price series. The seven dairy firms handled more than one-half of Wisconsin's butter, nonfat dry milk, and cheese.

Every firm interviewed used the Chicago Mercantile Exchange and National Cheese Exchange for "base" butter and cheese price quotations. Every firm also paid or received premiums (on the average) over exchange prices. None used the USDA Chicago wholesale butter price quotation or Wisconsin assembling point cheese price. For nonfat dry milk, some firms used "Chicago area" f.o.b. plant prices, and some used "country point" prices reported by USDA as a basis for pricing nonfat dry milk. Others relied on their "feel of the market" or their plant costs in determining nonfat dry milk prices.

With the exception of relatively small quantities of nonfat dry milk, no USDA Market News prices are used in pricing manufactured dairy products in Wisconsin. Exchange prices (which are used) do not reflect premiums and discounts, and are "central market" prices, not f.o.b. plant prices actually received for the product. Also, the Cheese Exchange price does not include carload assembly costs. Assembly charges are currently credited to sellers at 2¼ cents per pound over exchange prices. Assembly charges account for part of the premium structure.

Responses of interviewed firms to the price quotation issue were as follows: *Firm A* had a verbal contract for a cheese premium of 2¼ cents per pound over the National Cheese Exchange price on high quality 40-lb blocks. Premiums remain constant over long periods of time (1 year or longer), but are reduced on lower quality cheese. The firm also receives approximately ⅓ cent per pound transportation allowance for delivering cheese to the buyer's warehouse.

Firm A was satisfied with using the National Cheese Exchange price as a base, and the firm doubts whether USDA f.o.b. plant reported prices would be given much credence by either buyers or sellers. Firm A questions the accuracy and usefulness of prices plants or buyers would report because of premium, quality, style, and size variations reflected in the reported prices.

Firm B has a "written" cheese sales contract for 3 cents per pound premium over the National Cheese Exchange price on 40-lb blocks, plus ¼ cent per pound for cheese more than 1 year old. The buyer pays storage costs. The firm gets larger premiums on "in and out" or spot sales than on long-term contracts, and also receives a moisture premium based on the Exchange moisture adjustment chart.

The butter prices used by Firm B are based on the Chicago Mercantile Exchange price plus a small premium which is almost constant over time.

The firm's nonfat dry milk price is based on the USDA Market News country point price, plus their "feel of the market." They believe that quoted price ranges pose a problem and that more precise prices would be beneficial.

Firm B also believes that a USDA Market News country point cheese price would be inappropriate since it would also report price ranges rather than a precise price. They prefer Chicago Mercantile and National Cheese Exchange prices since they are precise and are not reported as a range. Firm B does not believe USDA Market News f.o.b. plant prices could be reliably used in product price formulas because of the many premiums, grades, and varieties of products involved. For example, seven different nonfat dry milk prices are recognized by Firm B.

Firm C bases their cheese sales price on the National Cheese Exchange price, plus a fixed contractual premium extending 1 year or longer, with a 6-month prior notice escape clause for both parties. Cheese prices and premiums are based on Wisconsin State brand (grade) prices, with a 90-day holding time requirement. If the cheese does not hold its quality for 90 days, the premium and price are reduced.

Firm C butter prices are based on the Chicago Mercantile Exchange price less a location adjustment, and nonfat dry milk prices are based on USDA Market News country point prices.

Firm C indicates that current pricing procedures are satisfactory because everyone uses the same prices or bases. However, management states that the premiums received are so secret that no plant would divulge them to USDA Market News and therefore f.o.b. country point cheese prices would be difficult to obtain. Firm C, therefore, indicates that the National Cheese Exchange price is the best operational price.

The firm also notes that large quantities of bulk butter are being sold at country points, so a country point butter price quotation would be possible if pursued by USDA Market News.

Firm D gets a 4-5 cents a pound premium over the National Cheese Exchange on 40 lb block cheese. The firm is not unhappy with current premium pricing procedures, but admits they are "dealing in the dark" on the premium structure.

The firm gets a ½ cent to 1 cent premium over the Chicago Merchantile Exchange price on butter sales. Butter premiums are more stable than those on cheese and generally much lower.

Farm assembly bulk tank trucks await unloading at supply-equalization plant.

All nonfat dry milk is sold f.o.b. country plant at negotiated prices with no premium, since its price is not based on exchange prices.

The firm has a problem with premiums on long-term contracts because they must be agreed to ahead of time and specified in the contracts, whereas premiums are negotiated on each uncommitted "in and out" transaction. Thus, long-term premiums can be out of line in either rising or falling cheese markets. They indicate such problems would not arise if a price base could be developed which reflected exchange prices plus premiums.

Firm D suggests that current pricing procedures are very imprecise, and this could create problems in the use of product formula pricing.

Firm E receives a 5¾ cents per pound premium over the Chicago Mercantile Exchange price for packaged butter, 1¼ cents per pound over the Exchange price for bulk butter on long-term contracts, and 1⅓ cents to 1¾ cents per pound premium for bulk butter on "in and out" sales. The firm is satisfied with the Mercantile Exchange price as a base price because everyone uses it.

This firm receives a 1½ cents per pound cheese premium over the National Cheese Exchange price, but shares in other premiums, thus increasing its effective premium to at least 2¼ cents per pound.

Nonfat dry milk powder prices are based on the M-W milk price plus their plant costs in manufacturing butter-powder (73 cents per cwt of milk in late 1975).

Firm E does not use the USDA Market News butter, cheese, and nonfat dry milk price quotations because they do not believe price ranges are meaningful, and they feel that price quotes represent guesses rather than what the product actually sells for.

Firm F pays ¼ cent per pound premium over the Chicago Mercantile Exchange price for 93-score hard bulk butter on long-term contracts (1½ years or more). The seller pays transportation costs—about ½ cent per pound on Wisconsin sales. The firm pays the 90-score Mercantile Exchange price for 90-score butter. They pay premiums of ½ to ¾ cent per pound on "in and out" butter purchases when butter is short, but the higher premiums are an exception. They also pay ¼ cent per pound premiums plus packaging costs of about 2½ cents per pound for packaged butter.

The firm generally stays with the ¼ cent premium on long-term contracts, which enables it to gross about 0.5% gross profit on bulk butter operations (between 0.4 cent and 0.5 cent per pound).

On nonfat dry milk, Firm F pays what the "trade calls for" and their "feel for the market" without regard to USDA Market News quotations.

Firm F favors use of the Chicago Mercantile Exchange for pricing bulk butter, but opposes packaged butter quotations because efficiency and packaging costs vary so much from plant to plant. They do not feel the USDA Market News bulk butter price has much validity. Firm F mistrusts telephone collection of prices as too imprecise, reflecting judgment and consensus rather than actual prices. They indicate that USDA Market News price range quotations are largely useless to the trade in establishing transaction prices.

The firm does not see the need for f.o.b. plant prices for butter, because f.o.b. Chicago Mercantile Exchange prices minus transportation costs are f.o.b. plant prices. However, the firm would like to see daily, rather than weekly, Mercantile Exchange prices because buyers are "stuck" for a whole week at one price in a falling market.

The firm also feels an "exchange" for nonfat dry milk powder would be valuable, and distrusts USDA Market News prices for powder for the same reasons as for butter.

Firm G bases their cheese pay prices on the National Cheese Exchange plus premiums of 4½ cents per pound on 40-lb blocks and 1½ cents on barrel cheese. These premiums vary over time and between varieties and types of cheeses as supply-demand conditions change. Barrel cheese occasionally has negative premiums and 40-lb blocks zero premiums.

This firm would like to see premiums built into the National Cheese Exchange price rather than negotiated as at present, thereby making the price more accurate and representative. The firm bases their sales prices on current Exchange prices plus premiums, and if premiums go up, they have a difficult time reflecting premiums in their sales price. Firm G observes that premiums develop because some firms need cheese and "bid" for it among suppliers—thereby driving up premiums all over the market. Increased premiums are not bid into the exchange price because that would not help price-setters get the cheese they need, since the price to all other firms would also go up immediately.

Firm G does not pay much attention to "assembly point" cheese prices. Their margin of error is only ½ cent per pound if they are to make a profit, and USDA Market News price "ranges" don't help them much. Instead, Firm G accepts the idea that the exchange price is a true indicator of supply-demand in the cheese market.

Suitability of Price Quotations for Product Price Formulas. Manufactured dairy product price quotations currently used by the trade have the following shortcomings as basis for product price formu-

TABLE 22.—Average Cheese Premiums per Pound Over National Cheese Exchange, Grade A, 40-Lb Block, and Barrel American Cheese Prices, Paid to Wisconsin-Midwest Cheese Manufacturers, F.O.B. Plant, Monthly, January 1973 to June 1977.

	Firm 1		Firm 2		Firm 3		Firm 4		Firm 5	
	40-lb Block	Barrel	40-lb Block	Barrel	40-lb Block	Barrel	40-lb Block	Barrel	40-lb Block	Barrel
1973										
Jan.	$0.0300	$0.0150	$0.0250	$0.0150	$	$0.0150	$	$	$	$
Feb.	0.0300	0.0150	0.0250	0.0150		0.0150				
Mar.	0.0325	0.0175	0.0250	0.0150		0.0150				
April	0.0325	0.0175	0.0350	0.0150		0.0150				
May	0.0325	0.0175	0.0400	0.0150		0.0200				
June	0.0350	0.0200	0.0350	0.0150		0.0200				
July	0.0350	0.0200	0.0350	0.0150		0.0200				
Aug.	0.0350	0.0200	0.0350	0.0150		0.0250				
Sept.	0.0350	0.0200	0.0400	0.0150		0.0250				
Oct.	0.0375	0.0200	0.0550	0.0250		0.0250				
Nov.	0.0400	0.0200	0.0550	0.0250		0.0300				
Dec.	0.0400	0.0250	0.0550	0.0250		0.0300				
1974										
Jan.	0.0550	0.0250	0.0550	0.0250		0.0300	0.0695			0.0852
Feb.	0.0575	0.0275	0.0550	0.0250		0.0300	0.0697			0.0901
Mar.	0.0600	0.0300	0.0550	0.0250		0.0325		0.1028		0.0954
April	0.0650	0.0300	0.0550	0.0250		0.0325		0.1065		0.0985
May	0.0650	0.0250	0.0450	0.0150		0.0225		0.1058		0.0978
June	0.0525	0.0225	0.0350	0.0150		0.0225	0.0601		0.0350	
July	0.0475	0.0175	0.0400	0.0100		0.0225	0.0562		0.0449	
Aug.	0.0450	0.0175	0.0400	0.0100		0.0225	0.0545			
Sept.	0.0450	0.0175	0.0400	0.0050		0.0225	0.0562			
Oct.	0.0450	0.0175	0.0400	0.0050		0.0325		0.0867		
Nov.	0.0425	0.0175	0.0350	0.0050		0.0325		0.0742		
Dec.	0.0375	0.0075	0.0350	0.0050		0.0325		0.0694		
1975										
Jan.	0.0275	0.0075	0.0350	0.0050		0.0325				
Feb.	0.0275	0.0150	0.0250	0.0100	0.0450	0.0325				
Mar.	0.0275	0.0150	0.0250	0.0100	0.0450	0.0325				
April	0.0375	0.0150	0.0250	0.0100	0.0450	0.0325				
May	0.0375	0.0150	0.0250	0.0100	0.0450	0.0325				
June	0.0375	0.0200	0.0350	0.0150	0.0450	0.0325				
July	0.0425	0.0200	0.0350	0.0150	0.0450	0.0325				
Aug.	0.0425	0.0200	0.0350	0.0150	0.0450	0.0325				
Sept.	0.0450	0.0225	0.0375	0.0150	0.0450	0.0325				
Oct.	0.0450	0.0200	0.0375	0.0175	0.0550	0.0275				
Nov.	0.0500	0.0300	0.0475	0.0300	0.0575	0.0450				
Dec.	0.0425	0.0250	0.0375	0.0275	0.0500	0.0300				
1976										
Jan.	0.0425	0.0250	0.0525	0.0250	0.0500	0.0350		0.0500		
Feb.	0.0358	0.0250	0.0450	0.0225	0.0554	0.0188		0.0250		
Mar.	0.0400	0.0240	0.0460	0.0200		0.0275		0.0250		
April	0.0450	0.0235	0.0495	0.0250	0.0400	0.0330		0.0250		
May	0.0450	0.0175	0.0475	0.0185	0.0450	0.0280		0.0284		
June	0.0450	0.0170	0.0450	0.0200	0.0420	0.0285		0.0286		
July	0.0450	0.0225	0.0500	0.0295	0.0460	0.0280		0.0194		
Aug.	0.0450	0.0215	0.0485	0.0245	0.0575	0.0300		0.0315		
Sept.	0.0500	0.0250	0.0450	0.0200	0.0500	0.0295		0.0400		
Oct.	0.0450	0.0200	0.0400	0.0200	0.0500	0.0295		0.0400		
Nov.	0.0400	0.0150	0.0400	0.0200	0.0500	0.0295		0.0400		
Dec.	0.0400	0.0150	0.0350	0.0200	0.0500	0.0295		0.0400		
1977										
Jan.	0.0350	0.0150	0.0350	0.0200	0.0500	0.0295		0.0400		
Feb.	0.0350	0.0100	0.0343	0.0153	0.0450	0.0325		0.0400		
Mar.	0.0300	0.0100	0.0337	0.0159	0.0450	0.0325		0.0400		
April	0.0300	0.0100	0.0341	0.0182	0.0400	0.0325		0.0400		
May	0.0300	0.0100	0.0339	0.0190	0.0400	0.0325		0.0400		
June	0.0300	0.0100	0.0338	0.0192	0.0400	0.0300		0.0400		

las: a) they are generally central market rather than f.o.b. country point prices; and b) they do not include premiums (which are frequently substantial and vary greatly over time), discounts, and carload assembly costs for cheese. For product price formula purposes, in which the best measure of average prices actually received by plants is essential, the country point f.o.b. quotes and the premium-discount adjustments have to be recognized.

USDA Market News now collects prices assemblers receive for cheese, but not prices assemblers pay plants for cheese. USDA Market News indicates it could collect f.o.b. country plant prices for Swiss, Italian, and American cheese, and also butter if industry cooperation could be obtained. Bulk butter prices, f.o.b. country point, were collected until the early 1960's and their reporting could be resumed. However, most butter is now printed in the country, so validity of f.o.b. country point bulk butter prices is lessened. Nonfat dry milk prices, f.o.b. country plant, are already being collected by the U. S. Department of Agriculture. Federal milk order auditors could check accuracy of reported prices, or milk orders could be amended to require the reporting of prices received for butter, cheese, and nonfat dry milk, f.o.b. plant, to the market administrator.

For product price formula purposes, it is desirable that monthly weighted average prices, f.o.b. plant, be obtained for the products. Federal order market administrators would be in a better position than the USDA Market News to collect weighted average f.o.b. plant prices. It probably would be necessary to obtain such information on a mandatory basis rather than voluntarily. Market News has no authority to require price reporting. Federal milk orders could be amended to require product price information essential to administration of the order program.

The obtaining of f.o.b. plant price information is complicated by variations in packaging, product composition, quality, size of transaction, and other conditions of sale. Efforts would have to be made to obtain information which related to specified types of transactions.

Premium Structure

Product price formulas require accurate product price data—prices plants actually receive for products. As previously indicated, exchange prices used by the cheese and butter trade are only base prices to which premiums are added in setting actual prices plants get for their products. (Premiums do not necessarily represent additional net income to plants; instead they may offset costs including assembly and grading incurred in selling to specific buyers.) Variations in these premiums for major Wisconsin and Midwest cheese, butter, and nonfat dry milk plants and wholesalers are indicated in Tables 22-25. These data indicate the magnitude and variations in adjustments which would have to be made to exchange and even USDA Market News price quotations to reflect actual prices plants received for manufactured dairy products.

Cheese premiums varied widely between firms and over time—from ½ cent to more than 10 cents per pound for the years 1972-1977 (Tables 22 and 23). Obviously, exchange price quotations are considerably understating actual cheese pay prices. The differences would have to be taken into consideration in developing equitable product price formulas.

TABLE 23.—Average Annual Cheese Premiums per Pound Over National Cheese Exchange, Grade A, 40-Lb Block American Cheese Prices, Paid by Four Major Buyers to Wisconsin-Midwest Cheese Manufacturing Firm No. 6, F.O.B. Plant Carload Lots, 1972 to 1975.

Buyer	1972	1973	1974	1975
A	$0.0325	$0.0350	$0.0475	$0.0375
B	0.0350	0.0525	0.0425	0.0425
C	0.0350	0.0400	0.0550	0.0525
D	0.0375	0.0365	0.0365	0.0515

TABLE 24.—Comparison of Grade A Butter Prices per Pound Paid Wisconsin-Midwest Manufacturers, F.O.B. Plant, and Chicago Mercantile Exchange 92-Score Butter Price, Monthly, January 1974 to July 1975.

	Firm 1	Firm 2	Firm 3
1974			
January	$+0.0114	$—0.0423	$+0.0277
February	+0.0053	+0.0227	+0.0150
March	+0.0143	+0.0127	+0.0060
April	—0.0223	—0.0159	—0.0130
May	+0.0117	—0.0121	—0.0002
June	+0.0083	—0.0052	0
July	+0.0057	+0.0111	+0.0012
August	+0.0016	+0.0068	+0.0020
September	+0.0022	+0.0067	+0.0040
October	+0.0044	+0.0148	—0.0002
November	+0.0099	+0.0187	0
December	—0.0131	—0.0370	—0.0096
1975			
January	+0.0071		+0.0068
February	+0.0069		0
March	+0.0057		0
April	+0.0093		+0.0010
May	+0.0097		0
June	+0.0058		+0.0018
July	—0.0030		+0.0142

Note: + sign indicates manufacturer's price is higher than Exchange price; — sign indicates lower.

TABLE 25.—Comparison of Nonfat Dry Milk Extra Grade Spray High Heat F.O.B. Plant Prices per Pound Paid Wisconsin-Midwest Manufacturers and USDA Market News, Chicago Area Prices for the Same Type and Quality Product, Monthly, January 1974 to July 1975.

	Firm 1	Firm 2	Firm 3
1974			
January	$+0.0385	$+0.1075	$+0.0567
February	+0.0006	+0.1500	+0.0404
March	—0.0298	+0.0750	+0.0150
April	+0.0144	—0.0125	—0.0145
May	+0.0272	—0.0437	—0.0310
June	+0.0372	—0.0039	—0.0190
July	+0.0111	+0.0101	—0.0164
August	+0.0192	+0.0113	—0.0132
September	+0.0178	+0.0192	—0.0132
October	+0.0179	+0.0325	—0.0122
November	+0.0232	+0.0200	—0.0110
December	+0.0201	—0.0062	—0.0110
1975			
January	—0.0139		—0.0083
February	—0.0111		0
March	—0.0230		+0.0003
April	+0.0074		+0.0002
May	+0.0133		—0.0014
June	+0.0074		—0.0052
July	+0.0065		—0.0088

Note: + sign indicates manufacturer's price is higher than average price reported for Chicago area; — sign indicates lower.

Butter premiums (or discounts) are less, and vary less than cheese premiums (Table 22). Few country point butter prices varied more than 2 cents per pound from Chicago Mercantile Exchange prices in 1974-75, and most variation was less than 1 cent per pound. Nonfat dry milk premiums or discounts ranged from plus 5.7 cents to minus 4.4 cents per pound above and below USDA Market News quotations in 1974-75 (Table 25). Thus, smaller adjustments would be needed in exchange prices for butter than for cheese or nonfat dry milk in developing product price formulas.

Processing Costs

Product price formulas require estimates of processing costs, *i.e.*, the cost of transforming raw milk into manufactured dairy products. Procedures used for estimating these costs include: a) analyzing records of plant operations, b) the synthetic firm approach, c) indexing base period processing costs, or d) "deriving" operating margins.

Costs from Plant Records. Computation of average dairy processing costs directly from plant records initially appears to be an appropriate method for fixing margins because it involves real plants. For the administrative agency, cost analysis eliminates much of the subjectivity in fixing margins. To gain

TABLE 26.—Annual Milk Receipts in Surveyed Minnesota-Wisconsin Dairy Plants, 1974.

Type of Plant	Total Milk Received	Range in Receipts	Average Receipts
		(mil. lb)	
Butter (5)	198.2	19.4 - 49.8	39.6
Nonfat Dry Milk (5)	639.7	19.9 - 240.8	127.9
Butter-Powder (5)	521.2	21.8 - 170.7	104.2
Cheese (10)	1,363.4	8.1 - 438.3	136.3

TABLE 27.—Ratio of Summary Products Sales Revenue to Total Dairy Revenues in Surveyed Minnesota-Wisconsin Dairy Plants, 1974.

	Butter Plants*	Nonfat Dry Milk Powder Plants†	Butter-Nonfat Dry Milk Powder Plants‡	Cheese Plants**
		Percentage Specialization		
Average	76.2	61.2	81.1	87.7
Range	36.7-98.2	51.0-63.3	74.9-88.1	31.7-100.0

Primary products are:

*For butter plants: 1) butter 2) skim milk (fluid) 3) buttermilk (fluid)

†For nonfat dry milk powder plants: 1) NFDM powder

‡For butter-nonfat dry milk powder plants: 1) butter 2) butter sold locally 3) NFDM powder 4) NFDM animal feed 5) buttermilk powder 6) buttermilk (fluid) 7) condensed skim 8) all dairy blend

**For cheese plants: 1) cheese 2) butter from whey cream 3) whey cream 4) dry whey 5) liquid whey 6) lactose insight into the feasibility and problems of using plant records, cost data were collected from representative Minnesota-Wisconsin plants manufacturing cheese, butter, nonfat dry milk, and butter-nonfat dry milk. Surveyed plants were selected by stratifying manufacturing dairy plants in Minnesota-Wisconsin into the four product groups. Twenty plants were selected randomly in each state, with the number in each group proportionate to the group's share of all dairy plants. Twenty plants participated in Minnesota and five plants participated in Wisconsin.

Average annual receipts of plants manufacturing nonfat dry milk, butter-powder, and cheese each exceeded 100 million lb of milk. Average annual receipts of butter plants were 40 million lb of milk (Table 26). Size ranges were considerable (for example, from 8 million to 438 million lb of milk annually in cheese plants).

Plants manufactured considerable quantities of dairy products other than their primary manufactured dairy products. "Specialization" fell as low as 32% for cheese plants, 37% for butter plants, and 51% for nonfat dry milk powder plants (Table 27), necessitating cost allocation among various enterprises. Joint costs were also allocated for processing plants that were units of large multi-plant firms, and/or where the dairy operation was part of a firm that included nondairy activities such as feeds, farm supplies, and locker plants. In all cases, a standard procedure for allocating joint costs was used.

Butter-powder processing costs were calculated in two ways: 1) processing skim milk and cream in specialized powder and specialized butter plants, and 2) processing skim milk and cream in combination butter-powder plants. The average costs of processing milk in combined butter-powder plants, \$0.307 per cwt, were less than the cost of processing powder alone in specialized drying plants—\$0.504 per cwt (with butter processing costs an additional \$0.236 per cwt of milk). Average costs of processing milk into cheese were \$0.792 per cwt (Table 28).

Individual plants had wide variations in processing costs—from \$0.239 to \$0.678 per cwt for butter-powder plants and \$0.678 to \$1.576 per cwt for cheese plants. There were also wide ranges in processing costs in "butter only" and "nonfat dry milk powder only" plants.

On the average, fixed costs were a rather constant proportion of all costs—12 to 14% for the four types of plants (Table 29). Labor was the major cost item for all operations, accounting for 30 to 40% of average total costs. The range of costs was substantial for each of the individual cost components.

Factors accounting for cost differences among plants include: 1) level of utilization of plant capacity, 2) depreciation procedures, 3) original construction costs which have continued to inflate over time, and 4) allocation of costs when a number of enterprise activities are involved.

These data indicate that use of average plant costs in product formula pricing would require some plants to pay considerably more than they could afford to pay, while low cost plants would benefit from wide margins. The data also indicate the problems of attempting to get information on average cost data from plant records.

Synthetic-Firm Costs. The synthetic-firm approach uses technical production relationships and costs from measurement of actual plant operations, from equipment manufacturers, and from engineering firms to determine resource and labor requirements for different sized plants. Market prices for wages and all inputs (fixed and variable) are applied to each component. Assuming maximum use of capacity, costs can be generated. If different techniques of production are available, lowest cost plants for any given volume can be selected from among the options. This procedure was followed in a study of cheddar cheese manufacturing costs by Lilwall and Hammond.[25]

[25] Lilwall, Nicholas and Jerome Hammond. 1970. Cheddar Cheese Manufacturing Costs. Univ. of Minn., Agri. Exp. Sta., Bull 501.

TABLE 28.—Costs of Processing Milk into Various Manufactured Dairy Products in Surveyed Minnesota-Wisconsin Dairy Plants, 1974.

	Butter Only Plants	Nonfat Dry Milk Powder Only Plants	Butter Only + Nonfat Dry Milk Powder Only Plants	Butter-Nonfat Dry Milk Plants	Cheese Plants
	Per cwt of Milk				
Weighted Average Costs	\$0.236	\$0.504	\$0.731	\$0.307	\$0.792
Range	\$0.109	\$0.346		\$0.239	\$0.678
	to	to		to	to
	0.478	0.700		0.678	1.576

TABLE 29.—Component Costs per Cwt for Surveyed Dairy Manufacturing Operations in Minnesota and Wisconsin, 1974.

	Butter			Nonfat Dry Milk Powder			Butter - Nonfat Dry Milk			Cheese		
	Av.	Range	St. Dev.	Av.	Range	St. Dev.	Av.	Range	St. Dev.	Av.	Range	St. Dev.
Depreciation	$0.0140	$0.0011-0.0408	$0.0163	$0.0348	$0.0210-0.0476	$0.0110	$0.0196	$0.0109-0.0876	$0.0321	$0.0722	$0.0268-0.0966	$0.0250
Management	0.0124	0.0000-0.0446	0.0183	0.0112	0.0000-0.0206	0.0086	0.0038	0.0000-0.0306	0.0156	0.0184	0.0000-0.4019	0.1255
Overhead	0.0006	0.0000-0.0016	0.0000	0.0138	0.0000-0.0450	0.0184	0.0132	0.0000-0.0296	0.0122	0.0034	0.0000-0.0185	0.0058
Property Taxes	0.0030	0.0000-0.0120	0.0049	0.0026	0.0000-0.0072	0.0030	0.0017	0.0000-0.0084	0.0034	0.0057	0.0027-0.0501	0.0156
Total Fixed	0.0300	0.0097-0.0764	0.0300	0.0624	0.0304-0.0811	0.0172	0.0384	0.0167-0.1182	0.0389	0.0997	0.0479-0.4788	0.1249
Labor	0.0956	0.0486-0.3136	0.1013	0.1953	0.1492-0.3187	0.0600	0.0924	0.0727-0.1639	0.0333	0.2530	0.1236-0.4731	0.1239
Fuel and Power	0.0137	0.0000-0.0273	0.0096	0.0611	0.0000-0.1489	0.0585	0.0160	0.0000-0.0547	0.0224	0.0377	0.0000-0.1975	0.0562
Other Utilities	0.0164	0.0091-0.0504	0.0160	0.0388	0.0231-0.0980	0.0315	0.0197	0.0141-0.0317	0.0074	0.0457	0.0128-0.1486	0.0440
Packaging Supplies	0.0139	0.0000-0.0225	0.0098	0.0139	0.0010-0.0324	0.0127	0.0375	0.0000-0.0695	0.0267	0.0771	0.0000-0.1863	0.0723
Supplies	0.0382	0.0001-0.1331	0.0630	0.0207	0.0084-0.0356	0.0088	0.0145	0.0052-0.0700	0.0258	0.0506	0.0000-0.2783	0.1228
Payroll Taxes	0.0080	0.0045-0.0146	0.0063	0.0126	0.0000-0.0229	0.0094	0.0057	0.0014-0.0088	0.0032	0.0122	0.0000-0.0345	0.0113
Other	0.0262	0.0088-0.0613	0.0180	0.0952	0.0423-0.1754	0.0511	0.0744	0.0444-0.2096	0.0811	0.1267	0.0523-0.3457	0.0933
Total Variable	0.2120	0.0981-0.5368	0.1678	0.4376	0.3151-0.6189	0.1100	0.2601	0.2022-0.5020	0.1521	0.6030	0.4577-1.0973	0.2386
Total Costs	0.2420	0.1078-0.5857	0.1892	0.5000	0.3456-0.7001	0.1264	0.2985	0.2388-0.6044	0.1822	0.7027	0.5467-1.5761	0.3342

*The differences in average total costs per cwt between Tables 28 and 29 are explained by the fact that the cost data in Table 28 have been adjusted for the amount of whole milk received at the plant but subsequently transshipped to another plant for processing.

An advantage of the synthetic-firm approach is that it standardizes all plants to a given point in time. Thus, prices for all factors of production are the same. On the other hand, the dairy industry is not organized in this manner. Plants were constructed at different times and they operate at different utilization levels. The extent of capacity in the industry is difficult to determine. As this varies for any given plant, costs per hundredweight of milk will vary.

The synthetic-firm approach is useful for analysis of plant efficiency and for planning of new facilities or plant expansion. However, it may yield rather misleading results regarding actual costs of manufacturing operations, and therefore may be inappropriate for use in constructing product price formulas.

Indexing Base Period Costs. "Indexing" involves adjusting base period manufacturing costs by an index over time of costs of processing inputs such as wages, packaging supplies, fuel and power, and construction costs, weighted according to their importance. The indexing procedure was used in computing margins presented in Table 30, with 1970 margins adjusted annually by annual changes in the index of hourly wage rates in food processing industries.

Data in Tables 31 through 33 indicate that use of indexed base period costs in computing margins for product price formulas generally resulted in cheese and butter-powder-cheese formula prices quite close to the M-W price series in the 8-year period 1970-77. Formula prices using indexed costs averaged within 8 cents of the M-W price in 3 of 8 years for butter-powder, 5 of 8 years for cheese, and 6 of 8 years for butter-powder-cheese. However, the differences widened in 1976 and 1977.

A major advantage of using the indexing procedure is that the data for construction of the index are readily available from government publications. The Survey of Current Business, published monthly by the Department of Commerce, reports prices and indexes for all the factors indicated above. The base year used will strongly influence the level of "indexed costs," so use of a representative base period is essential. A problem with this approach is that it does not adequately reflect efficiencies resulting from changes in factors such as plant size and new technology.

Costs from Derived Margins. Derived margins can be used to estimate processing costs for product-price formulas as long as there are some non-regulated plants manufacturing cheese, butter, and powder (but not handling fluid milk for packaging). Derived margins are the difference between the gross value of manufactured dairy products and average prices paid farmers for the milk used for the manufactured dairy products. This procedure, like indexing, is relatively simple and inexpensive. Product prices and pay prices for milk are both assembled by the Economics, Statistics, and Cooperative Service for other uses. No additional data are needed.

The derived margin approach to processing costs breaks down when all milk becomes Grade A. As long as competitive manufacturing grade milk prices are available, the derived margin approach has the advantage of providing a means of deriving product formulas for butter-powder and cheese that will closely approximate over time any particular measure of competitive pay price chosen. Derived margins, in turn, can provide a means of establishing separate prices for milk for butter-powder and for milk for cheese. To the extent that separate prices are desirable, derived margins provide an advantage over the M-W price, which is a measure of the average value

TABLE 30.—Calculation of Butter-Powder and Cheese Plant Processing Margins, 1969-1977.

Year	Dairy Product Processing Labor Force Earnings* (dollars per hour)	Index of Earnings (1969 = 100)	Projected Butter-Powder Margins† (1970 = 0.59)	Projected Cheese Margins‡ (1970 = 0.67)
1969	$3.03	100.0		
1970	3.26	107.6	0.59	0.67
1971	3.45	113.9	0.63	0.72
1972	3.65	120.5	0.67	0.76
1973	3.87	127.7	0.71	0.81
1974	4.18	138.0	0.75	0.86
1975	4.56	150.5	0.81	0.92
1976	4.95	162.4	0.89	1.01
1977			0.96	1.09

*Statistical Abstract of the United States, U. S. Dept. of Commerce, Bureau of the Census.

†The average margin for 1970, based on the difference between the 1970 M-W creamery pay price and the value of butter and nonfat dry milk produced from milk in 1970, adjusted by an index of labor earnings for the preceding year. (See Table 33 footnote for formula used to determine butter-powder value.)

‡The average margin for 1970, based on the difference between the 1970 M-W cheese plant pay price and the value of cheddar cheese, butter, and dry whey produced from milk in 1970, adjusted by an index of labor earnings for the preceding year. (See Table 32 footnote for formula used to determine cheese-butter-whey value.)

TABLE 31.—Amount Minnesota-Wisconsin Manufacturing Grade Price Exceeds Cheese Formula Price When Make Allowance Is Adjusted by Index Factors.*

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average	Absolute Average†
							Dollars per cwt							
1970	—0.21	—0.18	—0.08	—0.02	—0.03	—0.01	—0.02	—0.01	—0.01	—0.14	—0.12	—0.10	—0.08	0.08
1971	+0.01	+0.09	—0.13	—0.04	—0.02	—0.01	0	0	+0.06	+0.05	+0.06	—0.06	0	0.04
1972	—0.01	—0.02	—0.05	+0.04	+0.04	+0.03	—0.04	—0.06	—0.02	—0.04	—0.08	—0.06	—0.02	0.04
1973	+0.01	+0.03	+0.01	+0.04	+0.01	—0.01	—0.03	—0.10	—0.26	—0.07	—0.18	—0.15	—0.03	0.08
1974	—0.12	—0.14	—0.07	—0.07	+0.20	+0.22	+0.18	+0.03	+0.33	—0.27	—0.16	+0.09	—0.02	0.16
1975	+0.41	+0.34	+0.31	+0.25	+0.15	+0.08	+0.06	—0.11	+0.04	—0.13	+0.05	+0.12	+0.15	0.17
1976	+0.20	+0.52	+0.44	+0.09	+0.15	+0.12	+0.03	—0.20	+0.08	+0.26	+0.36	+0.36	+0.21	0.23
1977	+0.53	+0.46	+0.34	+0.18	+0.24	+0.39	+0.27	+0.12	—0.09	—0.13	—0.13	—0.21	+0.21	0.26

*Both prices at 3.5% butterfat. Cheese formula price: (weighted average of Wisconsin primary market, barrel and 40-lb. block, cheddar cheese prices times 9.66) plus (Chicago Mercantile Exchange Grade A butter price times 0.3) plus (Central States edible dry whey powder—\$0.08 (\$0.10 in 1977) times 5.5) minus manufacturing allowance based on the previous year's wage increases among dairy manufacturers calculated in Table 30. Cheddar cheese prices weighted by the total annual production in Wisconsin for the previous year.

		Barrels	Blocks
Weights:	1970-74	49	51
	1975	54	46
	1976	56	44
	1977	56	44

†Average ignoring signs.

TABLE 32.—Amount Minnesota-Wisconsin Manufacturing Grade Price Exceeds Butter-Powder Formula Price When Make Allowance Is Adjusted by Index Factors.*

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average	Absolute Average†
							Dollars per cwt							
1970	+0.38	+0.35	+0.24	—0.01	—0.12	—0.09	—0.10	—0.07	—0.04	+0.08	+0.14	+0.13	+0.07	0.15
1971	+0.17	+0.21	+0.19	—0.07	—0.16	—0.14	—0.14	—0.12	—0.07	—0.07	—0.05	+0.02	—0.02	0.12
1972	+0.10	+0.10	+0.18	+0.10	+0.09	+0.10	+0.14	+0.13	+0.10	+0.01	—0.02	—0.14	+0.08	0.10
1973	+0.03	+0.05	+0.06	+0.01	+0.04	+0.11	+0.01	—0.29	—0.15	+0.79	+0.87	+1.25	+0.23	0.30
1974	+1.53	+1.40	+0.77	+0.08	+0.04	—0.23	—0.23	—0.39	—0.14	—0.07	—0.13	—0.26	+0.20	0.44
1975	—0.06	—0.11	—0.10	—0.07	—0.02	0	—0.14	—0.16	—0.25	—0.41	—0.52	—0.47	—0.19	0.19
1976	+0.72	+0.34	+0.43	+0.26	+0.13	—0.07	—0.09	+0.21	+0.14	+0.09	+0.15	+0.15	+0.21	0.23
1977	+0.16	+0.13	—0.06	—0.30	—0.30	—0.33	—0.28	—0.29	—0.25	—0.25	—0.22	—0.13	—0.17	0.22

*Both prices at 3.5% butterfat. Butter-powder formula: (Chicago Mercantile Exchange Grade AA butter price times 4.27) plus (Central States area nonfat dry milk (spray) price times 8.3) minus manufacturing allowance based on the previous year's wage increase among dairy manufacturers calculated in Table 30.

†Average ignoring signs.

TABLE 33.—Amount Minnesota-Wisconsin Manufacturing Grade Milk Price Exceeds Butter-Powder-Cheese Formula Price When Make Allowance Is Adjusted by Index Factors.*

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average	Absolute Average†
	Dollars per cwt													
1970	+0.14	+0.13	+0.11	—0.01	—0.08	—0.06	—0.07	—0.05	—0.03	—0.01	+0.03	+0.04	+0.01	0.06
1971	+0.10	+0.15	+0.04	—0.06	—0.10	—0.08	—0.08	—0.06	—0.01	—0.01	0	—0.02	—0.01	0.06
1972	+0.05	+0.04	+0.07	+0.07	+0.07	+0.07	+0.05	+0.04	+0.04	—0.01	—$.05	—0.10	+0.03	0.06
1973	+0.02	+0.04	+0.03	+0.03	+0.02	+0.04	—0.01	—0.18	—0.21	+0.30	+0.27	+0.45	+0.08	0.13
1974	+0.49	+0.43	+0.24	—0.01	+0.14	+0.05	+0.03	—0.13	+0.16	—0.20	—0.15	—0.04	+0.06	0.17
1975	+0.24	+0.17	+0.16	+0.13	+0.09	+0.05	—0.01	—0.13	—0.05	—0.23	—0.16	—0.10	+0.02	0.13
1976	+0.39	+0.46	+0.44	+0.15	+0.14	+0.05	—0.01	—0.05	+0.10	+0.20	+0.28	+0.28	+0.21	0.21
1977	+0.44	+0.38	+0.24	+0.06	+0.10	+0.21	+0.13	+0.02	—0.13	—0.16	—0.15	—0.19	+0.12	0.18

*Both prices at 3.5% butterfat. Butter-powder and cheese formulas in Tables 31 and 32 were weighted annually in proportion to the relative quantities of milk used to produce nonfat dry milk and cheddar cheese in Minnesota and Wisconsin during the preceding year.

		Butter-Powder %	Cheese %
Weights	1970	59	41
	1971	54	46
	1972	51	49
	1973	43	57
	1974	37	63
	1975	37	63
	1976	36	64
	1977	25	75

†Average ignoring signs.

of milk in various uses. Margins reflected by the M-W price have shown considerable variation within a year. The derived margins approach tends to eliminate such short run variations.

Choosing the Make Allowance Procedure. Of the four methods specified for calculating processing costs, the "derived margin" procedure is simplest, most inexpensive, and most accurate—as long as unregulated competitive manufacturing milk pay prices are available. Make allowances (margins) can be calculated monthly by simple arithmetic procedures (see subsequent section entitled, Construction of Product Price Formulas).

After conversion to Grade A (and with the elimination of a competitive Grade B farm milk pay price), the indexing method of estimating processing costs has merits in terms of simplicity of procedure, cost of calculation, and reflection of changes in actual processing costs. Indexing can still be used for calculating processing costs when all milk becomes Grade A or regulated. Such is not the case for derived margins unless a method for retaining competitive pay prices is developed.

However, any administered price procedure will, at times, result in processing allowances that are too high for some plants and too low for others. If it is found that margin allowances are too low to permit a plant of reasonable operating efficiency to cover costs plus a competitive return on investment, adjustments in the base or index factors may have to be made.

Product Yields

Manufactured dairy product yields per hundredweight of milk are needed in computing product price formulas. Product yields vary for three reasons: 1) solids content of raw milk, 2) product specification, and 3) recovery of solids in processing operations. Even when the first two are known with a high degree of accuracy, the latter can still cause considerable yield variability. Nevertheless, yield factors must be selected if a product price formula is to be used. The following discussion deals with product yields for various manufactured dairy products, and factors accounting for variations in yields.

Butter Yields. The legal definition of butter specifies a minimum of 80% butterfat. Thus, for milk of a given butterfat content, maximum butter yields should be 125% of the amount of butterfat in the whole milk (100 ÷ 80). In trade terminology, the 125% factor is referred to as 25% overrun. However, losses of fat in milk separation, buttermilk, and other losses limit the yield to somewhat less than 25% overrun.

Four plants reported their yield (overrun) for this study (Table 34).

TABLE 34.—Overrun in Four Surveyed Butter Processing Plants, Minnesota, 1975.

Plant Number	Percent Overrun
1	22.97
2	22.69
3	24.22
4	23:42

The widest variation in yields occurred between plant two and plant three, with the butter yield of plant three exceeding that of plant two by more than ½ lb per cwt of milk. At current butter prices, this would have meant approximately another 5 cents in gross value per cwt of milk for the high yield plant.

Nonfat Dry Milk Yields. Nonfat dry milk yield is related to the nonfat solids content of the raw milk. However, the relationship is not precise. For example, yields of nonfat dry milk per hundredweight of whole milk reported by six Minnesota plants for this study show a 0.215 lb difference in yield between the high and low plants (Table 35). At current prices of powder, the yield differences amount to about 15 cents per cwt of milk.

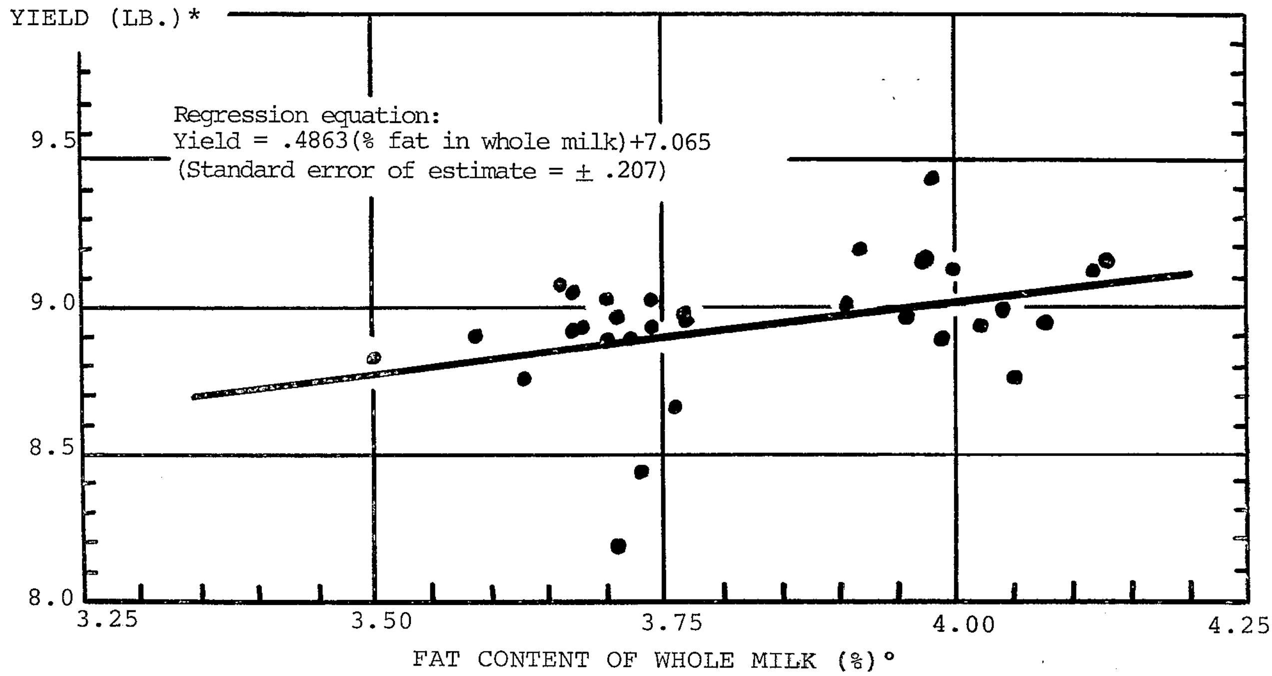
TABLE 35.—Nonfat Dry Milk Yields per Hundredweight of Whole Milk for Six Minnesota Dairy Plants, 1975.

Plant Number	Nonfat Dry Milk Yield per cwt of Whole Milk
1	8.092
2	7.877
3	8.047
4	7.968
5	8.002
6	8.033

There is some relationship between nonfat dry milk yields and the fat content of the whole milk. But again the relationship is not very precise. In a 1956 USDA study, 67% of nonfat dry milk yields varied within plus or minus 0.207 lb of the average for milk of a specified fat content (Fig. 1).

Cheese Yields. Yields of cheese per hundredweight of milk are influenced by moisture content—the higher the moisture, the greater the yield—and by fat and casein content of raw milk. The wide variations in cheese yields associated with variations in fat content of milk and moisture content of cheese are indicated in Table 36.

Cheese prices are adjusted according to moisture content, so value differences due to yields are somewhat offset by product price adjustments. Nevertheless, cheese yields would have to be taken into consideration in product price formulas.



*POUNDS OF NFDMS PER CWT. LIQUID SKIM °SEPARATED INTO 40% CREAM AND SKIM

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FIG. 1.—Nonfat dry milk solids yield in relation to fat content of whole milk.

TABLE 36.—Theoretical Yields of Cheddar Cheese Calculated by the Formula: Yield = (F + C) N.*

Milk Fat	(Moisture Content of Cheese)							
	34%	35%	36%	37%	38%	39%	40%	41%
%	lb	lb	lb	lb	lb	lb	lb	lb
3.0	7.905	8.058	8.186	8.313	8.441	8.568	8.721	8.874
3.1	8.148	8.279	8.410	8.541	8.672	8.803	8.960	9.118
3.2	8.366	8.500	8.635	8.769	8.907	9.038	9.200	9.361
3.3	8.583	8.722	8.860	8.998	9.136	9.274	9.439	9.605
3.4	8.801	8.943	9.084	9.226	9.367	9.509	9.679	9.848
3.5	9.019	9.164	9.309	9.454	9.599	9.744	9.918	10.092
3.6	9.237	9.385	9.534	9.682	9.831	9.979	10.157	10.336
3.7	9.454	9.606	9.758	9.910	10.062	10.214	10.397	10.579
3.8	9.672	9.828	9.983	10.139	10.294	10.450	10.636	10.823
3.9	9.880	10.049	10.208	10.367	10.526	10.665	10.876	11.066
4.0	10.108	10.270	10.433	10.595	10.758	10.920	11.115	11.310
4.1	10.325	10.491	10.657	10.823	10.989	11.155	11.354	11.554
4.2	10.542	10.712	10.882	11.051	11.221	11.390	11.594	11.797
4.3	10.761	10.934	11.107	11.280	11.453	11.626	11.833	12.041
4.4	10.978	11.155	11.311	11.508	11.684	11.861	12.073	12.284
4.5	11.196	11.376	11.556	11.736	11.916	12.096	12.312	12.528

*Yield = pounds of cheese per 100 lb of milk.
F = pounds of fat in 100 lb of milk.
C = pounds of casein in 100 lb of milk.
N = moisture factor.
Source: Van Slyke, L. L. and W. V. Price. 1949. Cheese. Oranga Judd Publishing Co., Inc., New York, p. 67.

CONSTRUCTION OF PRODUCT PRICE FORMULAS WHEN COMPETITIVE FARM MILK PAY PRICES ARE AVAILABLE

Class I utilization in Federal order markets averaged only 55% in 1976. Of the 45% of Federal order milk processed in manufactured dairy products, butter, nonfat dry milk, and cheese accounted for 63.4% of all Class II and Class III usage (butterfat basis). Therefore, product price formulas must be concerned primarily with three products—butter, nonfat dry milk, and cheese.

Product price formulas have not been more widely used because of the difficulty of obtaining representative plant cost information to determine make allowances. However, as long as competitive pay prices are available, the "derived margin" procedure described earlier can be used. Derived margins can be used to generate a margin (make) allowance, and the margin in turn can be used to derive a manufacturing milk price.

The following procedure illustrates the use of a butter-powder formula to calculate a price or to derive an apparent margin. Assume the following for a given month:

Grade AA butter price = $0.91 per lb
Nonfat dry milk price = $0.62 per lb
Yield of butter per cwt 3.5% B. F. milk—4.27 lb
Yield of powder per cwt 3.5% B. F. milk—8.3 lb
Minnesota-Wisconsin series price = $8.05 per cwt 3.5% B. F. milk

The gross return on butter-powder manufacture is:

(butter price x yield factor) + (powder price x yield factor)

($0.91 x 4.27) + ($0.62 x 8.3) = $9.03 per cwt gross return per cwt of 3.5% milk used in butter-powder.

The derived margin on butter-powder manufacture is:

(gross return per cwt on butter-powder) — (M-W price per cwt)

($9.03 per cwt) — ($8.05 per cwt) = $0.98 per cwt derived margin on milk testing 3.5% B. F. used for butter-powder.

If the margin of $0.98 per cwt remains relatively stable from month to month, it is possible to get an estimate of the Minnesota-Wisconsin price by subtracting the apparent margin from the gross return.

($0.91 x 4.27) + ($0.62 x 8.3) — $0.98 = $8.05 per cwt 3.5% B. F. milk.

The same procedure can be used in calculating derived margins for cheese manufacture.

Washing Out Errors in Product Prices or Yields Used

An interesting aspect of the derived margins approach is that small errors in yield factors, or product prices, are "washed out" as long as the errors are relatively constant from month to month. This is because variations in yields or product prices will be offset by equal variations in derived margins.

For example, if the measure of product price is too high relative to what plants actually receive, the calculated gross return will be "too high." But the derived margin will also be "high" by the same amount. Therefore, the formula can still approximate the M-W or any other target level which is sought, as long as actual margins taken remain relatively constant. In the same way, yield factors which are overstated or understated will be offset by an offsetting overstatement or understatement of the "true" margin.

The error cancellation effect can be illustrated by use of a product price formula to calculate the gross value per cwt of 3.5% butterfat milk for cheese:

(Wisconsin assembly point cheddar cheese price per pound x 9.45 lb yield per cwt of milk testing 3.5% butterfat)

+ (Chicago Grade A butter price x 0.3 lb yield fat in whey cream per cwt of milk)

+ (Dry edible whey price per pound — $0.08 x 5.5 lb yield dry whey per cwt of milk)

Using average prices for these products for November 1975, calculations are as follows:

$0.9931 x 9.45	$9.385
+ $0.9728 x 0.3	0.290
+ ($0.0845 — $0.08) x 5.5 =	0.027
Average gross value per cwt of 3.5% B. F. milk for cheese in Minnesota-Wisconsin in November 1975	$9.702
Minnesota-Wisconsin cheese plant pay price per cwt of 3.5% B. F. milk in November 1975	$8.840
Derived average margin per cwt of milk for cheese plants in November 1975	$0.862

However, if instead of using the Wisconsin assembly point price for 40-lb blocks, the average November 1975 National Cheese Exchange price of $0.9506 is substituted for 40-lb blocks, the gross value and derived margin are reduced significantly:

$0.9506 x 9.45 =	$8.983
+ $0.9728 x 0.3	0.290
+ ($0.0845 — $0.08) x 5.5 =	0.027
Average gross value per cwt of 3.5% B. F. milk for cheese in Minnesota-Wisconsin in November 1975	$9.300
Minnesota-Wisconsin cheese plant pay price per cwt of 3.5% B. F. milk in November 1975	$8.840
Derived average margin per cwt of milk for cheese plants in November 1975	$0.460

Thus, the apparent margin for cheese plants is reduced $0.40 per cwt of milk (from $0.86 to $0.46) by using National Cheese Exchange prices rather than assembly point prices for cheese. However, calculated reserve milk prices from a product price formula will be unaffected, since the lower exchange prices (than assembly point prices) exactly offset the lower apparent margins.

Assembly Point Cheese Prices = ($0.702 gross value per cwt of 3.5% B. F. milk) — ($0.862 per cwt margin) = $8.84 per cwt calculated reserve milk prices per cwt

National Exchange Cheese Prices = ($9.300 gross value per cwt of 3.5% B. F. milk) — ($0.460 per cwt margin) = $8.84 per cwt calculated reserve milk prices per cwt

Different yield factors can also influence apparent margins. The 9.45 lb yield factor used in the illustration is the yield of 37% moisture cheese from 100 lb of milk containing 3.5% butterfat. However, cheese assemblers report prices on a standard moisture basis. Therefore, if Wisconsin assembly point prices are used in a formula, it is appropriate to use a yield factor which relates to standard moisture cheese. The midpoint of the standard moisture range is about 38.4%. The midpoint translates into a yield factor of about 9.66 lb instead of the 9.45 lb yield applied to 37% moisture cheese. With the November 1975 assembly point price of $0.9931 per lb, the use of a cheese yield of 9.66 lb, instead of the 9.45 lb, increases gross returns by 21 cents per cwt of milk.

Gross Cheese Returns per cwt of 3.5% B. F. Milk

(9.66 lb cheese yield per cwt milk) x ($0.9931 per lb cheese) =	$9.593
(9.45 lb cheese yield per cwt milk) x ($0.9931 per lb cheese) =	$9.385
Increased gross cheese return =	$0.208

However, the higher yield also increases derived margins by the same amount as gross cheese returns increased, since the manufacturing milk price is subtracted from a higher gross value of milk for cheese.

Derived Margins per cwt of 3.5% B. F. Milk

($9.910 gross value with 9.66 lb cheese yield) — ($8.84 M-W) =	$1.070
($9.702 gross value with 9.45 lb cheese yield) — ($8.84 M-W) =	0.862
Increased derived margin =	$0.208

Thus, calculated reserve prices from a product price formula with a yield of 9.66 lb of cheese per cwt milk would be the same as if a yield of 9.45 lb of cheese per cwt of milk was used.

Calculated Reserve Milk Prices per cwt

($9.910 gross value with 9.66 lb cheese yield) — ($1.070 margin) =	$8.84
($9.702 gross value with 9.45 lb cheese yield) — ($0.862 margin) =	$8.84

In summary, it is possible with a product price formula using varying product prices and yields to determine make allowances and to calculate a reserve milk price that closely represents the net value of milk. The product price used may be "too high" or "too low" relative to what plants actually receive, but this in turn results in returns being "too high" or "too low." In effect, "too high" or "too low" a product price is offset by "too high" or "too low" a derived margin. The same offsetting tendency exists with yield factors that are "too high" or "too low."

Derived Product Price Formulas

The derived margin approach to product price formulas represents a blend of the competitive pay price approach, and the product price formula approach. The concept can "force a price" at the M-W level or any other level sought. Derived margins avoid the difficult problem of determining a representative make allowance on the basis of frequently conflicting cost information obtained at public hearings. The question remains, however, as to which particular competitive pay price the derived margin should be calculated.

The following product price formulas are examples of the procedure for determining Class III price obligations. The sources of data for yield and price factors are described in subsequent sections.

1. Butter-powder formula for milk testing 3.5% butterfat:
   (Chicago Mercantile Exchange Grade AA butter price per pound x 4.27) + (Central States spray extra grade powder price per pound x 8.3) — 12-month moving average derived margin between gross return on butter-powder and M-W creamery pay price per cwt (pay prices for individual states weighted by the two state production of nonfat dry milk for the previous year).
2. Cheddar cheese formula for milk testing 3.5% butterfat:
   (Average of Wisconsin 40-lb block and barrel assembly point price per pound x 9.66) + (Chicago Mercantile Exchange Grade A butter price per pound x 0.3) + (dry edible whey Central States price per pound — $0.08[26]) x 5.5 — 12-month moving average derived margin between gross return on cheese and M-W cheese plant pay price per cwt (pay prices for individual states weighted by the two state production of American cheese for the previous year).
3. Combined butter-powder-cheese formula for milk testing 3.5% butterfat: a combination of the above two formulas weighted annually in proportion to the relative quantities of

[26] $0.10 in 1977.

milk used in the production of nonfat dry milk and cheese in Minnesota and Wisconsin.

Suggested Product Price Measures for Use in Product Formulas

If a product price formula is used for reserve milk pricing, the following price series for the product values are suggested:

Butter. The butter price suggested for use is the average price for Grade AA butter for the month as reflected by "last significant transactions" on the Chicago Mercantile Exchange (reported by the USDA in weekly dairy market news reports). In calculating the monthly average, the price arrived at each Friday can be assigned to that day, and to each day Monday through Thursday of the following week. The Chicago Mercantile Exchange spot market price for butter, plus or minus fairly fixed differentials, is used as the basis for settlement on nearly all butter sold by creameries, and by receivers to their wholesale customers.

The AA grade butter price is used for the butter-powder formula since it is the predominant quality sold. However, the Grade A butter price is used in the cheese formula since whey cream butter generally is Grade A or Grade B, and more reliable price information is available for Grade A butter.

Nonfat Dry Milk. The price for spray process nonfat dry milk reported for the Central States area is suggested for use in the product price formula because it is based on information from processors who sell a large volume of nonfat dry milk. Also, it is calculated at the end of the month, whereas the f.o.b. plant price reported by the Economics, Statistics, and Cooperative Service (which is currently used in a few Federal orders) is not available until the 5th of the following month. The Central States price is representative of current values, whereas the USDA Chicago area price includes long-term contract sales. It is recommended that midpoints of price ranges for high and low heat extra grade powder be averaged.

In calculating monthly averages, weekly prices reported on Thursday are assigned to each day Monday through Thursday of that week and to Friday of the preceding week.

Cheese. The Wisconsin assembly point cheddar cheese price is suggested for use in calculating the cheese product price formula. This price closely reflects price changes which occur on the Wisconsin Cheese Exchange. Exchange prices reflect small sales volumes and do not reflect premiums (see Tables 22 and 23). The assembly point price is based on larger sales volumes and it reflects some premiums.

Increasing quantities of cheese are sold in barrels, and the question arises as to whether to use the price for barrels, or 40-lb blocks, or some weighted average of the two. Normally there is a fairly standard differential between barrels and blocks, with barrels averaging about 3 cents lower over the past several years. This differential reflects labor and packaging cost differences. Generally, both prices move up and down together, and as long as this is the case, either price could be used. However, prices depart from their normal relationship often enough to make the use of an average of the two prices preferable. Currently, about one-half of the cheddar cheese produced is packed in barrels and 35% in 40-lb blocks. The remaining 15% is other styles of cheddar cheese. Most of these other styles are priced on the basis of changes in the 40-lb block price.

At present a simple average of the two prices might be appropriate. However, weighting on the basis of relative quantities produced would reflect changes in the relative importance of barrel cheese as compared to other styles. In computing a monthly average, weekly prices reported on Wednesday are assigned to Monday through Thursday of that week and Friday of the preceding week.

Whey. The price for edible dry whey in the Central States production area is an appropriate measure of whey values because of the large volume of sales in that area.

Since many cheese plants do not have their own whey drying facilities, it is not reasonable to include the cost of drying whey in the make allowance. For purposes of the formula during the time period studied, whey was considered to have no value to cheese plants until the price of edible dry whey exceeded 8 cents per lb—approximately the cost of assembling and drying of liquid whey. When edible dry whey prices were less than 8 cents per lb, whey did not contribute to a plant's net income and therefore did not influence cheese plant farm milk pay prices. However, when edible dry whey prices are above their processing costs, whey adds to net income of cheese plants and therefore should be reflected in a cheese product price formula.[27]

Suggested Yield Factors for Use in Product Formulas

Dairy technologists have calculated theoretical yields for various dairy products from milk of varying composition. Blending information on theoretical yields, with information obtained on the basis of plant operations, permits derivation of yield factors which are reasonably reflective of average yields per cwt of 3.5% milk.

[27] On the basis of 1977 cost data, whey does not contribute to a cheese plant's net proceeds until the price of dry edible whey exceeds 10 cents per lb. Therefore, the factor of 10 cents rather than 8 cents would be appropriate in 1977. As whey drying costs increase, further adjustment in this factor would be required.

Butter. The yield factor used for butter is 4.27 lb of butter per cwt of 3.5% milk. The 4.27 represents a 22% overrun on 3.5 lb of butterfat. This yield factor is based on Federal order hearing evidence involving 11 plants handling 40% of the reserve milk in the Chicago Regional Federal Milk Order marketing system.

Powder. In a butter-powder operation, both nonfat dry milk and buttermilk powder are produced. The yield factor used is 8.3 lb of nonfat dry milk and buttermilk powder per 100 lb of milk testing 3.5% butterfat. Hearing record data from the 11 plants handling 40% of reserve milk in the Chicago market indicated a combined yield factor of 8.367 lb of nonfat dry milk and dry buttermilk. The butter-powder formula uses only the price of nonfat dry milk as the powder price factor. In order to recognize the fact that the price of dry buttermilk is often slightly lower than the price of nonfat dry milk, the yield factor has been scaled down to 8.3 lb. An alternative would be to use separate product prices and yields for nonfat dry milk and dry buttermilk. However, this refinement tends to complicate the formula, and is not considered necessary as long as the prices of nonfat dry milk and dry buttermilk remain about the same.

Cheese. The yield of cheese of standard moisture content used in the suggested cheese formula is 9.66 lb of cheese per cwt of milk of 3.5% butterfat content. This yield is based on the table developed by Van Slyke and Price (Table 36). Plant operators generally indicate Van Slyke and Price provide as good an approximation as is available of cheese yields, based on butterfat content of the milk and moisture content of the cheese. Protein content of the milk is an important factor in determining cheese yields, but protein content cannot be reflected directly within the framework of a pricing formula which considers only butterfat content of the milk.

The yield factor of 9.66 applies to standard moisture cheese. This is appropriate because reported Wisconsin assembly point prices apply to standard moisture cheese. Standard moisture cheese is defined as cheese with a moisture content between 37.8% and 39.0%. The midpoint of this, 38.4%, and the 9.66 yield are obtained by interpolation from the Van Slyke-Price table.

Butter from Whey Cream. The yield factor of 0.3 lb of butter from the whey cream obtained from 100 lb of 3.5% milk is used by several large plant operators in calculating what they can afford to pay producers for milk for cheese. This yield factor, therefore, is used in the suggested cheese formula.

Whey. The dry whey yield factor of 5.5 lb of dry whey from 100 lb of 3.5% milk used to make cheddar cheese is also based on data from several large whey processors. It is therefore used in the recommended cheese formula.

Yield and price factors used in the proposed product price formulas will not be realized by all plants. Some plants may have higher yields and/or price factors and some may have lower. However, as indicated earlier, the "derived margin" procedure will "wash out" the net effects of a "too high" or "too low" yield or price factor, and the Class III price obligation will therefore be unaffected. Therefore use of these yield and price factors in the proposed product price formulas is recommended.

Processing and Marketing Cost Estimates Suggested for Use

Derived Margins and Class III Price Obligations. Derived monthly butter-powder and cheddar cheese margins, product formula prices, and monthly differences between the butter-powder-cheese formula prices and the M-W price during the period 1971-77 are presented in Tables 37 through 45. Derived cheese margins ranged from \$0.68 to \$0.88 per cwt during the 7-year period, and derived butter-powder margins ranged from \$0.56 to \$1.16 per cwt. The cheese margin is influenced by the fact that the formula uses the price of barrel cheese as well as the 40-lb block price. The margin therefore appears lower than the make allowance used for cheese in the price support program. If based only on 40-lb blocks, the margin would be 20 to 25 cents higher. Annual average derived butter-powder-cheese formula prices were within \$0.04 per cwt of M-W prices during 5 of the 7 years, and cheese formula prices were within \$0.04 per cwt of M-W prices during 3 of the 7 years. These product price formulas, therefore, yielded Class III price obligations quite close to M-W prices.

On the average, butter-powder formula prices were at greater variance with M-W prices. Butter-powder formula prices were within \$0.10 per cwt of M-W prices during only 3 of the 7 years, were \$0.25 per cwt above M-W prices during 1 year, and were as much as \$0.17 per cwt below M-W prices during another year.

Examination of Table 42 shows some interesting differences between product price formulas and competitive pay prices. It shows it is possible to construct a butter-powder-cheese formula which, over a period of time, will average close to the M-W price. However, substantial month-to-month variations occur. These are due in part to competitive pressures. For example, in the last 9 months of 1977, when milk supplies were burdensome and competition for milk supplies less keen, the product price formula consistently overstated by sizable amounts the M-W price. On the other hand, when milk supplies were very

TABLE 37.—Derived Butter-Powder Plant Average Margins.*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Dollars per cwt											
1971	0.60	0.60	0.61	0.62	0.63	0.63	0.64	0.64	0.65	0.66	0.68	0.69
1972	0.71	0.73	0.73	0.71	0.70	0.69	0.68	0.67	0.66	0.67	0.68	0.70
1973	0.70	0.71	0.73	0.74	0.75	0.76	0.77	0.80	0.81	0.76	0.69	0.58
1974	0.46	0.35	0.29	0.27	0.28	0.29	0.31	0.32	0.32	0.38	0.45	0.56
1975	0.68	0.80	0.88	0.91	0.91	0.91	0.92	0.91	0.92	0.95	0.98	1.02
1976	0.96	0.93	0.90	0.88	0.86	0.86	0.86	0.83	0.81	0.78	0.74	0.70
1977	0.75	0.78	0.82	0.87	0.92	0.96	0.99	1.03	1.07	1.11	1.14	1.16

*12-month moving averages centered on 12th month of differences between a Minnesota-Wisconsin creamery pay price and the gross value from a butter-powder formula. Gross value butter-powder is (Chicago Mercantile Exchange Grade AA butter price times 4.27) plus Central States area nonfat dry milk (spray) price times 8.3). Minnesota-Wisconsin creamery pay price is pay prices for the individual states weighted by the two-state production of nonfat dry milk for the previous year. Gross values and pay prices both at 3.5% butterfat.

TABLE 38.—Butter-Powder Formula Price for Milk Testing 3.5% Butterfat Using Derived Margins for Make Allowances.*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	Dollars per cwt												
1971	4.65	4.65	4.64	4.91	4.93	4.90	4.90	4.88	4.88	4.86	4.84	4.85	4.82
1972	4.83	4.81	4.80	4.82	4.82	4.83	4.86	4.94	5.01	5.17	5.33	5.52	4.98
1973	5.41	5.40	5.47	5.59	5.58	5.57	5.71	6.58	6.96	6.65	6.79	6.82	6.04
1974	6.86	7.14	7.84	8.13	7.36	7.00	6.96	7.21	7.26	7.26	7.19	6.86	7.26
1975	6.99	6.97	6.89	6.91	6.94	7.01	7.38	7.76	8.37	8.87	9.19	9.34	7.72
1976	8.11	7.87	8.16	8.19	8.20	8.42	8.83	8.84	8.40	8.28	8.26	8.29	8.32
1977	8.24	8.21	8.51	8.99	8.96	8.93	8.90	8.86	8.88	8.84	8.83	8.80	8.75

*(Chicago Mercantile Exchange Grade AA butter price times 4.27) plus (Central States area nonfat dry milk (spray) price times 8.3) minus margins listed in Table 37.

TABLE 39.—Derived Cheese Plant Average Margins.*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Dollars per cwt											
1971	0.67	0.66	0.67	0.67	0.68	0.68	0.68	0.68	0.69	0.68	0.68	0.68
1972	0.68	0.69	0.68	0.68	0.68	0.68	0.68	0.68	0.69	0.69	0.71	0.71
1973	0.71	0.71	0.71	0.71	0.71	0.72	0.72	0.73	0.75	0.76	0.77	0.78
1974	0.80	0.82	0.83	0.84	0.84	0.83	0.82	0.82	0.82	0.83	0.85	0.84
1975	0.81	0.78	0.76	0.74	0.74	0.75	0.76	0.78	0.77	0.77	0.76	0.76
1976	0.78	0.76	0.76	0.78	0.79	0.79	0.80	0.81	0.80	0.78	0.75	0.74
1977	0.72	0.74	0.74	0.75	0.75	0.74	0.74	0.72	0.75	0.79	0.83	0.88

*12-month moving averages centered on 12th month of differences between a Minnesota-Wisconsin cheese plant pay price and the gross value from a cheese milk formula. Gross value cheese is (weighted average of Wisconsin assembling points, barrel and 40-lb. block cheddar cheese price times 9.66) plus (Chicago Mercantile Exchange Grade A butter price times 0.3) plus (Central States edible dry whey powder price minus $0.08 ($0.10 in 1977) times 5.5). Minnesota-Wisconsin cheese plant pay price is pay prices for the individual states weighted by the two-state production of American cheese for the previous year. Gross values and pay prices both at 3.5% butterfat. Cheddar cheese prices weighted by the total annual production in Wisconsin for the previous year.

		Barrels	Blocks
Weights:	1971-74	49	51
	1975	54	46
	1976	56	44
	1977	56	44

short in late 1973 and early 1974 and competition for milk supplies was strong, the M-W price was substantially higher than the butter-powder-cheese formula.

Table 45 shows the substantial differences that exist at times between the value of milk for cheese and for butter-powder. For example, in 1974 the cheese formula was $1.42 higher than the butter-powder formula in January and by June the cheese formula was 88 cents lower than butter-powder. This is an extreme example of the difficulty of developing a single price reflective of the value of milk for manufacture. It also shows why, at times, butter-powder plant operators are dissatisfied with a Class III price based on the M-W price which is weighted heavily by the value of milk for cheese.

Indexing Base Period Costs. Calculating Class III (reserve milk) price obligations from derived margins will no longer be possible when complete conversion to Grade A occurs, and unregulated Grade B farm milk pay prices are no longer available. When this occurs, one procedure that could be used is the previously described "indexing base period costs" method of estimating processing costs (Table 30). These "indexed make costs" can then be applied to the previously described product price formulas and Class III price obligations calculated in the same fashion as with "derived margins" (Tables 31, 32, and 33).

Data in Tables 31, 32, and 33 indicate that use of indexed base period costs in product price formulas generally results in formula prices quite close to M-W series prices. Class III price obligations could therefore be calculated over a longer time period with considerable precision, even though unregulated Grade B farm milk pay prices were not available.

Margins and Yields from Plant Records. The information obtained in the survey into plant costs indicated wide cost variations. Such variations in cost are consistent with the experience of the U. S. Department of Agriculture in receiving cost information at public hearings. Hearing evidence generally has reflected wide variations in costs and variations in accounting procedures used in calculating costs. The variations in reported costs were one reason that the U. S. Department of Agriculture shifted away from the use of product price formulas in Federal milk orders. Variations in yield information and product

TABLE 40.—Cheese Formula Price for Milk Testing 3.5% Butterfat Using Derived Margins for Make Allowances.*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	Dollars per cwt												
1971	4.83	4.80	4.99	4.92	4.83	4.81	4.81	4.81	4.80	4.81	4.82	5.03	4.86
1972	5.06	5.06	5.17	5.00	4.98	5.00	5.13	5.21	5.19	5.29	5.45	5.52	5.17
1973	5.52	5.52	5.64	5.69	5.75	5.83	5.90	6.56	7.23	7.61	7.86	8.12	6.44
1974	8.28	8.32	8.25	7.82	6.75	6.12	6.15	6.40	6.90	7.12	6.93	6.34	7.12
1975	6.50	6.65	6.71	6.87	7.05	7.20	7.45	7.95	8.38	8.88	8.95	9.12	7.64
1976	8.93	7.98	8.41	8.58	8.37	8.42	8.89	9.39	8.59	8.23	8.16	8.16	8.51
1977	8.03	8.05	8.32	8.76	8.72	8.56	8.73	8.89	9.17	9.17	9.18	9.29	8.74

*(Weighted average of Wisconsin assembling points barrel and 40-lb block cheddar cheese price times 9.66) plus (Chicago Mercantile Exchange Grade A butter price times 0.3) plus (Central States edible dry whey powder price minus $0.08 ($0.10 in 1977) times 5.5) minus margins and barrel and block weights listed in Table 39.

TABLE 41.—Combined Butter-Powder-Cheese Formula Price for Milk Testing 3.5% Butterfat Using Derived Margins for Make Allowances.*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	Dollars per cwt												
1971	4.73	4.72	4.80	4.91	4.88	4.86	4.86	4.85	4.84	4.84	4.83	4.93	4.84
1972	4.94	4.93	4.98	4.91	4.90	4.91	4.99	5.07	5.10	5.23	5.39	5.52	5.07
1973	5.47	5.47	5.57	5.65	5.68	5.72	5.82	6.75	7.11	7.20	7.40	7.56	6.28
1974	7.75	7.88	8.10	7.93	6.98	6.45	6.45	6.70	7.03	7.17	7.03	6.52	7.17
1975	6.68	6.77	6.78	6.88	7.01	7.13	7.42	7.88	8.38	8.88	8.67	9.20	7.64
1976	8.63	7.94	8.32	8.44	8.31	8.42	8.87	9.19	8.52	8.25	8.20	8.21	8.44
1977	8.08	8.09	8.37	8.82	8.78	8.65	8.77	8.88	9.10	9.09	9.09	9.17	8.74

*Butter-powder price from Table 38 and cheese formula price from Table 40 weighted by nonfat dry milk and cheese. Respective weights listed in Table 42.

TABLE 42.—Amount Minnesota-Wisconsin Manufacturing Grade Milk Price Exceeds Butter-Powder-Cheese Formula Price Using Derived Margins for Make Allowances.*

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average	Absolute Average†
	Dollars per cwt													
1971	+0.06	+0.11	+0.01	—0.08	—0.11	—0.10	—0.09	—0.08	—0.01	—0.02	+0.01	0	—0.02	0.06
1972	+0.03	+0.04	+0.06	+0.05	+0.04	+0.04	+0.02	0	0	—0.05	—0.07	—0.11	0	0.04
1973	—0.04	—0.02	—0.02	—0.02	—0.02	+0.01	—0.04	—0.19	—0.20	+0.29	+0.24	+0.38	+0.03	0.12
1974	+0.35	+0.26	+0.05	—0.20	—0.05	—0.14	—0.16	—0.31	—0.34	—0.35	—0.27	—0.12	—0.11	0.22
1975	+0.12	+0.08	+0.08	+0.06	+0.01	—0.02	—0.07	—0.18	—0.11	—0.28	+0.17	—0.12	—0.02	0.11
1976	+0.27	+0.31	+0.28	0	—0.01	—0.10	—0.16	—0.20	—0.06	+0.01	+0.06	+0.04	+0.04	0.12
1977	+0.11	+0.07	—0.06	—0.22	—0.16	—0.05	—0.12	—0.24	—0.36	—0.35	—0.30	—0.30	—0.16	0.20

*Both prices at 3.5% butterfat. Butter-powder-cheese formula price based on gross values from butter-powder and cheese formulas quantified in footnotes of Tables 37 and 39, minus butter-powder and cheese margins listed in Tables 37 and 39, weighted by relative annual quantities of milk used to produce nonfat dry milk and cheddar cheese in Minnesota and Wisconsin during the preceding year as follows:

		Butter Powder %	Cheese %
Weights	1971	54	46
	1972	51	49
	1973	43	57
	1974	37	63
	1975	37	63
	1976	36	64
	1977	25	75

†Average ignoring signs.

TABLE 43.—Amount Minnesota-Wisconsin Manufacturing Grade Milk Price Exceeds Butter-Powder Formula Price, Using Derived Margins for Make Allowances.*

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average	Absolute Average†
	Dollars per cwt													
1971	+0.14	+0.18	+0.17	—0.08	—0.16	—0.14	—0.13	—0.11	—0.05	—0.04	0	+0.08	—0.01	0.11
1972	+0.14	+0.16	+0.24	+0.14	+0.12	+0.12	+0.15	+0.13	+0.09	+0.01	—0.01	—0.11	+0.10	0.12
1973	+0.02	+0.05	+0.08	+0.94	+0.08	+0.16	+0.07	—0.20	—0.05	+0.84	+0.84	+1.12	+0.25	0.30
1974	+1.24	+1.00	+0.31	—0.40	—0.43	—0.69	—0.67	—0.82	—0.57	—0.44	—0.43	—0.45	—0.20	0.62
1975	—0.19	—0.12	—0.03	+0.03	+0.08	+0.10	—0.03	—0.06	—0.10	—0.27	—0.35	—0.26	—0.10	0.14
1976	+0.79	+0.38	+0.44	+0.25	+0.10	—0.10	—0.12	+0.15	+0.06	—0.02	0	—0.04	+0.16	0.20
1977	—0.05	—0.05	—0.20	—0.39	—0.34	—0.33	—0.25	—0.22	—0.14	—0.10	—0.04	+0.07	—0.17	0.18

*Both prices at 3.5% butterfat. Butter-powder prices quantified in Table 38.
†Average ignoring signs.

TABLE 44.—Amount Minnesota-Wisconsin Manufacturing Grade Milk Price Exceeds Butter-Powder Formula Price, Using Derived Margins for Make Allowances.*

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average	Absolute Average†
	Dollars per cwt													
1971	—0.04	+0.03	—0.18	—0.09	—0.06	—0.05	—0.04	—0.04	+0.03	+0.01	+0.02	—0.10	—0.04	0.06
1972	—0.09	—0.09	—0.13	—0.04	—0.04	—0.05	—0.12	—0.14	—0.09	—0.11	—0.13	—0.11	—0.10	0.10
1973	—0.09	—0.07	—0.09	—0.06	—0.09	—0.10	—0.12	—0.18	—0.32	—0.12	—0.22	—0.18	—0.14	0.14
1974	—0.18	—0.18	—0.10	—0.09	+0.18	+0.19	—0.14	—0.01	—0.21	—0.30	—0.17	+0.07	—0.08	0.15
1975	+0.30	+0.20	+0.15	+0.07	—0.03	—0.09	—0.10	—0.25	—0.11	—0.28	—0.11	—0.04	—0.02	0.14
1976	—0.03	+0.27	+0.19	—0.14	—0.07	—0.10	—0.18	—0.40	—0.13	+0.03	+0.10	+0.09	—0.03	0.14
1977	+0.16	+0.11	—0.01	—0.16	—0.10	+0.04	—0.08	—0.25	—0.43	—0.43	—0.39	—0.42	—0.16	0.22

*Both prices at 3.5% butterfat. Cheese formula prices quantified in Table 40.
†Average ignoring signs.

TABLE 45.—Amount Cheese Formula Price Exceeds Butter-Powder Formula Price for Milk Testing 3.5% Butterfat Using Derived Margins for Make Allowances.*

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average	Absolute Average†
	Dollars per cwt													
1971	+0.18	+0.15	+0.35	+0.01	—0.10	—0.09	—0.09	—0.07	—0.08	—0.05	—0.02	+0.18	+0.04	0.11
1972	+0.23	+0.25	+0.37	+0.18	+0.16	+0.17	+0.27	+0.27	+0.18	+0.02	+0.12	0	+0.19	0.19
1973	+0.11	+0.12	+0.17	+0.10	+0.17	+0.26	+0.19	—0.02	+0.27	+0.96	+1.07	+1.30	+0.40	0.40
1974	+1.42	+1.18	+0.41	—0.31	—0.61	—0.88	—0.81	—0.81	—0.36	—0.14	—0.26	—0.52	—0.14	0.64
1975	—0.49	—0.32	—0.18	—0.04	+0.11	+0.19	+0.07	+0.19	+0.01	+0.01	—0.24	—0.22	—0.08	0.17
1976	+0.82	+0.11	+0.25	+0.39	+0.17	0	+0.06	+0.55	+0.19	—0.05	—0.10	—0.13	+0.19	0.24
1977	—0.18	—0.16	—0.19	—0.23	—0.24	—0.37	—0.17	+0.03	+0.29	+0.33	+0.35	+0.49	0	0.25

*Cheese formula prices and butter-powder formula prices listed in Tables 40 and 38, respectively.
†Average ignoring signs.

price information obtained from plants have also been a problem in product price formulas. However, it may be possible to resolve these problems if procedures can be developed by which the market administrator regularly could collect product yield, product price, and cost data directly from handlers.

The product yield and cost data would only have to be collected from handlers regulated by the Chicago Regional and Upper Midwest Federal Orders. The provision could require that all handlers regulated by the Chicago and Upper Midwest Orders supply market administrators with yield, cost, and price data which would be used to establish a make allowance for milk going into butter-powder and cheese. The information would be supplied on all Grade A milk and manufacturing grade milk in the handlers' plants, both pool and non-pool milk. The purpose for collection of the data would be to establish a Class III price for milk processed into hard products, and possibly a basic formula price for Class I pricing purposes.

Sequentially, the process would involve determining the gross value of high quality hard dairy products (per cwt of milk), sold in standardized packages on a volume basis, at actual transaction prices.

The next step would be to determine make allowances for milk utilized in Class III. The make allowance includes all cost elements associated with processing and marketing milk in dairy manufacturing plants. These costs should cover labor, packaging, fuel, power, selling, and transportation. It would be necessary to make a complete analysis of volume items (size, quantity, type of product, etc.). The procedure would provide data so that an average make allowance could be established. There are also many indirect costs associated with manufacturing dairy products that would have to be evaluated and allocated in determining the cost of processing 100 lb of milk.

The analysis would have to be geared to a standard package at a specific point in the production process. The overall make allowance used to establish the Class III price would exclude special packages and packaging, and special product formulation and premiums paid for special quality products. The procedure would establish a unified system of determining and allocating costs. It may be necessary to provide some technical assistance to handlers so that a coordinated system of accounts could be established. The major problem would be the allocation of administrative, field service, and selling costs. The problems of allocation would be complicated for multi-plant companies with different operations and where a portion of the Grade A milk was utilized as Class I milk on the fluid market.

The procedure would provide information on plant efficiency. New plants with high capital costs, established plants with efficient operations, and obsolete plants with high operating costs would mean substantial cost variations. Detail would be obtained on levels of overhead relative to degrees of integration into the marketing system. Costs of processing milk based on grade and quality programs could also be determined.

Upon establishment of the cost procedures, the system could use movers to adjust certain components of the make allowance. Volatile processing cost items could be adjusted without frequent or continuous surveys of plants. Another method for updating the make allowance is the selection of a representative sample of plants which would supply current data, thereby serving as an indicator of industry trends.

Regardless of the system devised, the entire plant population might be evaluated on a regular basis to assure validity of the make allowance and to reflect all conditions in the market affecting processing and marketing of Class III milk.

Price data collected for the product formula could be applied to establish a basic price. However, it must be recognized that gross value in many cases involves further processing, small packages, special moisture contents, and storage for a special market. Also, product composition often differs based on customer requirements. The various cheese varieties require that compensating price adjustments be made. Essentially, standardized products need to be specified for the price factor.

Special problems to consider in establishing make allowances for manfactured milk from plant records are:

1. Special attention must be given to the Environmental Protection Act. Dairy plants are faced with varying costs in this area, and the plants have limited control over pollution control rates.
2. The whey disposal problem has a significant impact on cheese plants, since there is no market for the whey solids in some periods. The disposal of whey is a substantial cost to the industry.
3. The Occupational Safety and Health Act adds to cost and therefore must be considered.
4. With fewer plants, hauling milk from farm to plant will raise costs for more distant farms. It may be necessary to allocate a part of farm hauling costs if hauling subsidies occur.

The make allowance, properly stuctured, would: 1) reflect the technical advances made within the industry, 2) take into account significant cost shifts, 3) generate farm milk prices that would push toward efficient resource allocation, and 4) be beneficial in directing plant management decisions.

PROS AND CONS OF PRODUCT PRICE FORMULAS FOR PRICING RESERVE MILK

The dairy industry has been concerned throughout the history of Federal milk orders about the method employed in pricing pooled milk processed into butter-powder and cheese. Organizations and plants handling reserve supplies have felt settlement prices on Class III milk have been too high at some times and too low at others. Organizations primarily associated with supplying milk to processors have felt that prices should be raised in order to improve returns to farmers. Non-pool plants making cheese contend that low Class III prices have resulted in unfair competition in procuring manufacturing milk supplies. Realistically constructed product price formulas could help solve some of these problems.

There are several important advantages with product price formulas in pricing reserve milk.

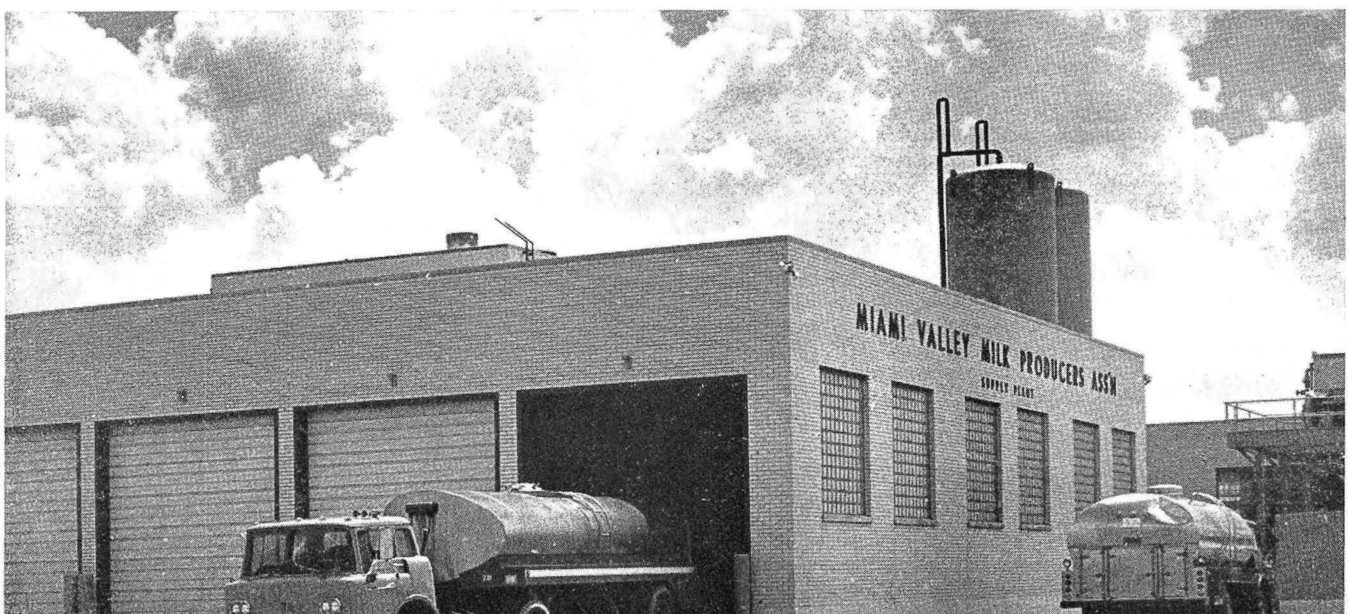
1. Product price formulas reflect what average processing firms can afford to pay for milk. Situations have developed in recent years where an increasing demand for cheese and declining demand for butter and nonfat dry milk have forced butter-powder plants regulated under Federal milk orders to pay more for milk than they can obtain from products produced from the milk. Processors under Federal orders are required to pay the M-W price even when it exceeds their gross return. Nonregulated firms are not. Product price formulas, as well as specified competitive pay prices, can reduce these types of inequities in that they would provide a means for establishing separate prices for milk for butter-powder and milk for cheese.

2. The widespread availability of current product price information would also permit calculating "final" reserve milk prices from product price formulas on the last day of any given month. Competitive pay prices such as the M-W price have not been available until the fifth day of the following month.

3. Product prices adjust to clear the market of all products. If yield and processing factors in formulas are representative, formulas based on product prices normally adjust to clear the market of milk.

4. Product price formulas are reasonably easy to understand and use.

5. Product price formulas are an equitable method of pricing milk, especially if separate class prices



Tanker of cream moves from receiving room after separation.

are established for milk used for cheese and for butter-powder.

6. When product prices are above CCC purchase prices, then product price formulas tie reserve milk prices to "competitive markets" at levels that clear the market. If product prices are at CCC purchase prices, product price formulas could still continue to operate, and generate prices targeted by the price support level.

7. Product price formulas can be available in the absence of any competitive pay price series.

8. The mechanics of product price formulas provide for specifying a make allowance. To the extent it is possible to develop reliable cost information for different types of reserve milk handling conditions, it is possible to reflect such cost differences in the make allowance.

9. Product price formulas can be constructed using the derived margins approach. This approach approximates the level of competitive pay prices while retaining some of the other advantages of product price formulas.

There are also disadvantages that need to be recognized in using product formulas to price reserve milk.

1. It is difficult to get reliable information on plant costs. However, the derived margins approach can minimize this type of problem.

2. Available product prices do not completely reflect average prices received f.o.b. plant. In particular, reported cheese prices probably do not reflect premiums paid.

3. Make allowances become obsolete fairly rapidly. Fuel costs and changes in the volume of milk handled per plant are two significant cost factors that are constantly changing. The hearing process has proved too slow to adequately keep formula make allowances current. This problem can be alleviated through automatic means of adjusting make allowances such as indexing.

4. The prices of butter and cheese are established on the basis of limited trading by a limited number of firms. While there have been only isolated indications of questionable activities in these markets, there is concern about using "thin" product markets as the basis for pricing billions of pounds of milk.

5. Product price formulas reflect what a plant of average efficiency can afford to pay for milk over a period of time. Such formulas may not reflect competitive pressures which at times cause plants to pay significantly more or less than they can afford to pay.

6. Product price formulas with high marketing margins can make the handling of reserve milk excessively profitable. Handlers would then be reluctant to release milk for fluid uses when needed. As a result, fluid handlers would be apt to set retail fluid milk prices at levels consistent with the artificially high margins for manufacturing use milk. Therefore, high margins for Class III milk may generate higher margins for Class I products. Further, fluid plants may have to pay higher than Class I minimum prices to attract milk to fluid use.

In summary, product price formulas have advantages and disadvantages. They can perform positively in terms of meeting several of the primary objectives of reserve milk pricing. Product prices adjust on the basis of competitive market conditions. Reserve milk prices therefore will move accordingly. It is essential that reported prices, yields, and make allowances accurately reflect conditions in industry. These factors probably can be specified with appropriate precision if adequate resources are directed to developing the correct factors. If competitive pay prices are not available, product price formulas represent an effective alternative for pricing reserve milk.

Product Price-Competitive Pay Price Formula

A negative feature of product price formulas is that make allowances are difficult to keep current. A related criticism directed at competitive pay prices is that they are not available until some time after the time to which they apply. A possible alternative for calculating a pay price which overcomes these two problems is a combined product price-competitive pay price formula.

An estimated pay price could be calculated by the last day of any month by adjusting the competitive pay price for the previous month by the change in the gross value of milk which occurred since then, as determined by a product formula. For example, using a product formula, the gross value to manufacturing plants of 100 lb of milk made into manufactured products for a month could be compared to the previous month. The change in the gross value would then be added to or subtracted from the pay price for the previous month to estimate a current monthly pay price.

Since product prices are currently available, an estimate of a change in a pay price could be made on the last day of the month or on an earlier day during the month if available product prices were felt representative of monthly average product prices. Thus, the pay price could be made more timely. The product formula would not account for a plant margin or make allowance since such a cost would already be accounted for by the competitive pay price. This alternative assumes that the margin in the current month is the same as in the base month. Since a new base competitive pay price would be used each month, short-run changes in margins would be reflected with only a 1-month lag.

A combined product price-competitive pay price formula could be developed to estimate an average price for milk in all manufacturing uses or the price for milk in any specific use for which there is a competitive pay price series.

ESTABLISHING RESERVE MILK PRICES THROUGH THE HEARING PROCESS

Establishing the price for reserve milk solely on the basis of evidence presented at public hearings, and maintaining that price between hearings, is an alternative to automatic formula pricing or a competitive pay price series. Periodic hearings could be scheduled on a regular basis to consider the need for price changes, or hearings could be held when specified changes in the economic situation occur that indicate the need for price adjustment. This procedure was used to price milk in fluid uses in the early years of the Federal order program. It was recently used in the California state milk control program but for Class I pricing only. There have been no instances where the hearing process has been used to directly fix prices to be paid for milk used in manufactured dairy products.

Before considering possible procedures and the advantages and disadvantages of the hearing pricing mechanism, it is useful to examine those situations where it has been used. Regulated Class I milk prices from 1933 until during World War II frequently were fixed directly by the hearing process. Prices were altered only by holding another hearing. Harris and Hedges stated that this procedure was reasonably satisfactory until 1937 because: 1) procedures for holding hearings for changing the level of price were rather simple and quick, and 2) it was a period of stable (although depressed) economic conditions that did not require frequent price changes.[28]

The beginning of World War II introduced greater variability into the demands for dairy products. Wartime demands were expanding, but at a variable rate that was very difficult to predict. Dissatisfaction with the fixed prices under Federal orders increased as price adjustments failed to keep up with changing demands and supplies. In 1942, price ceilings were placed on milk prices and direct payments were made to farmers to stimulate milk production. For the time being, fixed fluid milk prices under orders ceased to be a problem, but it was apparent that substantial price increases would be needed when price ceilings were removed after the war. By the end of 1946, all Federal order markets had adopted some type of formula to establish fluid milk prices.

[28]Harris, Edmond S. and Irwin R. Hedges, **op. cit.**, pp. 8-10.

Procedures

The hearing process, as currently administered for Federal order promulgation and amendment, requires a number of steps. They are: 1) petition for hearing, 2) the hearing at which evidence is received, 3) period for filing of briefs, 4) preparation of recommended decision by the USDA, 5) time for filing of exceptions to the recommended decision, 6) writing of the final decision, and 7) producer approval. The procedures can be long and unwieldy. A technique which was examined by the Milk Pricing Advisory Committee for Class I pricing specifies a required annual hearing for the purpose of fixing the price.[29] A similar procedure might be applied to reserve milk pricing with the option of holding emergency hearings during the year if there are strong indications of a need for price changes.

The advantages and disadvantages of the hearing process for direct pricing of reserve milk, as with other pricing mechanisms, are partially dependent on whether or not all milk in the U. S. is regulated under orders or whether some manufacturing use milk remains unregulated.

Advantages of Fixed Prices Through the Hearing Process

1. The hearing approach is understandable and it permits interested parties to participate in the pricing procedures whenever a change in price is being considered.

2. The hearing approach provides freedom to consider factors that influence milk prices. With formula pricing, the price movers are limited to those specified by the formula.

3. When most or all milk has converted to Grade A, the observation has been advanced that the price set for reserve milk would be the basic force establishing product prices. For this reason, product formulas would be much less meaningful.

Disadvantages of Fixed Prices Through the Hearing Process

1. The hearing approach is a more costly procedure than formula pricing. Use of the hearing process requires expenditures for travel, meeting places, reports, hearing records, and preparation of personnel for participation in the hearing. The automatic pricing mechanism avoids these costs. The administrative costs of calculating and announcing a monthly formula price are small. Hearings regarding formula pricing need to be called only when it appears that the existing formula is not reflecting the demand and supply situation in the market.

2. The hearing approach is an unwieldy and time-consuming procedure for changing prices. The

[29]Knutson, Ronald D., **et al.**, **op. cit.**, pp. 78-79.

TABLE 46.—Minnesota-Wisconsin Manufacturing Grade Milk Prices, 3.5% Butterfat, by Months, 1975-1977.

	1975	1976	1977
January	$6.80 per cwt	$8.90 per cwt	$8.19 per cwt
February	6.85	8.25	8.16
March	6.86	8.60	8.31
April	6.94	8.44	8.60
May	7.02	8.30	8.62
June	7.11	8.32	8.60
July	7.35	8.71	8.65
August	7.70	8.99	8.64
September	8.27	8.46	8.74
October	8.60	8.26	8.74
November	8.89	8.25	8.79
December	9.08	8.25	8.87

time required for changes, except for emergency conditions, is a minimum of 2 to 3 months.

The delays that are necessary with hearings may lead to a situation where economic conditions that warranted price changes may have passed before price changes are made. In recent years, several large and rapid changes in nonregulated manufacturing grade milk prices occurred within periods of a few weeks. The price changes were necessary to clear the market. The formula and competitive series used for order pricing brought about nearly simultaneous adjustments of Federal order reserve milk prices. The Minnesota-Wisconsin prices reported in Table 46 demonstrate the difficulties that direct fixing of reserve milk prices by the hearing process would have in reflecting market conditions. A price range of $2.28 per cwt in 1975, 74 cents in 1976, and 71 cents in 1977, together with month-to-month changes that were as high as 65 cents (January to February 1976), indicate that the hearing process could not perform adequately in periods of volatile price change.

3. Use of the hearing process for directly pricing reserve milk while unregulated manufacturing milk is available can lead to different prices for manufacturing use milk in the two markets. The price difference would occur because hearings could not be called for every movement in nonregulated manufacturing milk prices. Different prices in regulated and unregulated markets are inconsistent with the objectives of reserve milk pricing.

It should be noted that the public hearing process could effectively be used to adjust make allowances in product price formulas at regular intervals. In this way, product price formulas would be used to establish the reserve class price, but public hearings would be essential for keeping the make allowance component relevant.

In the situation where essentially all milk has converted to Grade A and is pooled in the regulatory program, reserve milk prices established by the public hearing process would continue to be subject to the market clearing criterion.

Shortages or surpluses at the fixed price are likely to be the rule. Even if the process yields a reserve milk price that clears the market when the price is fixed, continually changing supply and demand will soon make the price obsolete. Furthermore, there is no guarantee that the hearing process will even arrive at a price that will clear the market.

In both the short run and long run, the reserve milk price must be a market clearing price and must reflect continually changing supply/demand conditions for milk used for manufactured dairy products. If returns from reserve milk products are below the equivalent reserve milk price, buyers would not accept the milk. If returns from reserve milk products are above the equivalent reserve milk price, Class I prices would have to reflect added premiums in order to assure adequate supplies. The more severe problem is associated with a reserve milk price higher than market conditions justify. It probably would be necessary to rely on dairy price support program purchases in any situation that introduces the public hearing process for directly fixing reserve milk prices.

The public hearing process has proved itself over the history of milk price regulation to be an excellent means for establishing and amending Federal milk orders. More specifically, the price provisions that have been adopted have proved to perform on a superior basis when prices were established indirectly through formula rather than directly by the public hearing itself. In the future, with the likely demise of manufacturing grade milk price series, the public hearing process will continue to be vital, but direct pricing of reserve milk solely through public hearings would pose significant problems. The role of the public hearing relative to reserve milk pricing will be to adjust the procedures employed for establishing the reserve milk price as market conditions warrant, but direct fixing of reserve milk prices by public hearing would not adequately serve the objectives of reserve milk pricing.

ECONOMIC INDEX FORMULA: PROS AND CONS

Consideration of economic index formulas in milk pricing has been addressed almost exclusively to pricing Class I milk. For logical reasons, the direct use of economic index formulas to price reserve Grade A milk has never been advanced as a serious proposition. As a practical matter, the availability of competitive pay price series and product price formulas has precluded any demonstrated need for an economic index formula. More basic has been the critical factor that reserve Grade A milk prices have had to be very closely related to manufacturing grade milk prices and to returns available from milk processed into manufactured products. There is little room for error in pricing reserve Grade A milk.

Where economic index formulas have been used to price Class I milk, they have been adjusted or modified periodically as changing market conditions over time tended to outmode the formula. Some errors in pricing Class I milk were permissible because reserve utilization of the milk provided a ready solution to pricing errors on the high side at least. Therefore, economic index formulas for pricing Class I milk have been used and have received considerable acceptance in some markets. However, pricing of reserve milk cannot afford any significant distortions, and economic index formulas have not been considered as a possible means of establishing reserve milk prices.

While reserve milk prices have been related very closely to manufacturing grade milk prices, it should also be recognized that manufacturing grade milk prices have been influenced for many years by the price support program. Support prices for milk are based upon the parity formula, which is one form of an economic index formula. The parity formula contains three factors, including: 1) the recent 10-year average of the "all milk wholesale" price series, 2) the recent 10-year average of the index of prices received by farmers, and 3) the current index of prices paid by farmers. In periods when manufacturing grade milk prices are at or near the support level, which are usually the same as periods when milk is in excess supply relative to demand, the support price clearly is a major factor affecting the level of manufacturing grade milk prices. It is therefore fair to observe that during such periods an economic index formula is the dominant factor affecting manufacturing grade milk prices and, in turn, reserve Grade A prices. However, there is a clear distinction between the application of the parity formula to establish a support price on manufacturing grade milk as compared to the application of any proposed economic index formula for direct pricing of reserve supplies of Grade A milk. The parity formula affects reserve Grade A prices because of its direct impact upon manufacturing grade milk prices. It should not be concluded that since there is an economic index formula influence in pricing reserve Grade A milk at the present time that it is then appropriate to consider economic index formulas for the current direct pricing of reserve Grade A milk.

The question of the applicability of an economic index formula to pricing of reserve class milk in the long run, *i.e.*, when the industry effectively has converted to one grade of milk, is another matter. The presumed absence of a competitive pay price series at that time suggests that an economic index formula is one of the alternatives which should be evaluated. Further, the elimination of the basic constraint of having to relate the reserve class price to manufacturing grade milk prices also argues for evaluation of an economic index formula. At the same time, the price generated by the economic index formula would still have to pursue a market clearing objective.

With conversion to Grade A an accomplished fact, the pricing of reserve milk would have to be evaluated in two different contexts: 1) with a price support program, and 2) without a price support program. Assuming that a product purchase type price support program continues to be operational, it is logical that the support price would be announced for reserve class (Class III) milk. In fact, the support price would represent the minimum class price for reserve milk. Assuming a flexibility in the procedures used to establish the support price, comparable to the 75 to 90% of parity range now available, price adjustments could be made as warranted. If the reserve price is too high as indicated by the supply-demand conditions, the support price and reserve price could be adjusted downward at a subsequent price announcement. If the reserve price was too low, as indicated by supply-demand conditions across the milk industry, the flexibility in price support policy would permit an administrative adjustment upward in the reserve price-support price. In fact, some type of supply-demand adjustment could be attached to the support price in order to provide automatic flexibility. Actually, if market conditions were such that reserve milk was generating a higher value than the established support-reserve price, an alternative measure of the value of reserve milk such as a product formula would probably be necessary to make pricing regulations operational.

The implication in this discussion of a support price being maintained in the situation of no manufacturing grade milk is that the parity formula would be used to establish the "support-reserve" price. This would be feasible even under current computational procedures because: 1) there will continue to be an "all milk wholesale" price; and 2) although the current artificial adjustment to estimate a parity equivalent for manufacturing grade milk would be eliminated, a procedure for estimating the "normal" relationship between the all milk wholesale price and the support-reserve price could be developed.

Also, the support price could be implemented in terms of an "all milk" price. While the parity formula, as one application of an economic index type formula, might be the appropriate alternative to adopt for establishing the price of reserve class milk, other forms of economic index formula could also be considered. As long as the price support program stood available as an outlet for reserve product, the short-run concerns with the formula establishing a "bad" price would be relatively limited. Required adjustments in the formula could be made. Support-reserve prices on the high side would be constrained by reaction to price support expenditures and by public-consumer opposition. Prices on the low side would generate upward *price adjustments* in the formulas in order to meet adequate supply requirements. Both instances are not unlike the situation that characterizes price support decisions currently.

The second context is that in which there is no price support program and there is no manufacturing grade milk. The question is whether or not an economic index formula could be used to price reserve class milk in such a situation. The problem that emerges in attempting to establish a minimum reserve class price in this situation is that there is no room for error. There is neither an alternate usage nor a government purchase program to provide a market outlet for milk which comes onto the market but which no one is willing to pay for because the established price is too high. Or, in the instance where the price is too low, there would be no incentive to shift milk from lower value uses to higher value uses. In fact, milk might be diverted from higher value uses, and decreased producer prices would lead to lower milk production than is deemed necessary. Since it is recognized that an economic index formula can, in fact, establish reserve prices that will not perform a market clearing function, a fair conclusion is that an economic index formula would not be feasible for pricing reserve milk in the absence of a price support program. If there is a price support program, an economic formula would be feasible only when product markets are at price support levels.

Conceivably, if an economic index formula was used to price reserve milk, and if milk supplies were left "homeless" as a result, cooperatives would (or could) process that milk into storable products. This would mean that pool compensation might have to be made to those cooperatives at the difference between the established reserve price and the equivalent market values of the excess products. However, such an arrangement would, in effect, be building one set of provisions (cooperative payments) in order to correct another set of provisions (economic index formula). As such, it would be poor policy to utilize an economic index formula to price reserve milk when such an arrangement would likely generate uneconomic effects.

In summary, three different marketing situations for reserve milk have been described in relation to economic index policy. These include: 1) pricing reserve Grade A milk while manufacturing grade milk continues to be a factor in the market, 2) pricing reserve Grade A milk after full conversion and with a price support program, and 3) pricing reserve Grade A milk after full conversion and without a price support program. The use of an economic index formula to price reserve milk could be counterproductive and create disorderly marketing conditions in the first and third situations. An economic formula logically could be implemented to price reserve milk in the second situation where all milk marketed is Grade A quality and where a price support program was in operation. In that event, the support price and the reserve class price would have to be integrated to the point that they were synonymous. The economic index formula utilized to establish the support-reserve price would probably be the same as the parity formula or some other economic index.

SUMMARY—CONCLUSIONS—IMPLICATIONS

The principal objective of this study was to present and analyze alternative mechanisms for pricing Grade A milk used for manufactured dairy products in Federal order milk markets. Currently, reserve milk is priced at the average level of prices paid for nonregulated manufacturing grade milk in Minnesota and Wisconsin—the M-W manufacturing milk price series. Although this price series has been criticized in several respects, it has provided a reasonable guide to plants of the value of milk used in manufactured dairy products. The mechanism appears to have avoided problems of homeless milk or shortages for fluid uses in Federal order markets. These two problems may occur when milk prices are set at inappropriate levels. The most serious criticisms of the M-W price have occurred when the price of cheese was high relative to butter and powder price. This created a situation where the M-W price was high relative to the value of milk used for butter-powder.

The need to examine alternatives to the existing pricing mechanisms arises because of the declining volume of nonregulated manufacturing grade milk. Manufacturing grade milk fell from 30% of all U. S. milk marketings in 1966 to 19% in 1976. For Minnesota and Wisconsin, the percentage of Grade B milk fell from 63% to 39% during the same period. Some nonregulated manufacturing grade milk is likely to be available for quite a number of years. However, at some time before Grade B milk disappears, the volume may be so small that pay prices for it will not be representative of the average value of milk for manufacturing uses.

Four mechanisms for administratively fixing prices for milk used in manufactured dairy products under Federal orders were examined: 1) competitive price series, 2) product price formulas, 3) economic indicator formulas, and 4) direct pricing by public hearing. The method and the strengths and weaknesses of each mechanism were examined in detail.

1. The competitive price series procedure ties the prices for milk in manufacturing uses in Federal orders to prices paid for manufacturing grade milk in nonregulated markets. The Minnesota-Wisconsin manufacturing price is a competitive price series and it is currently used to price Federal order manufacturing use milk. It is basically a competitively determined price, however, only when wholesale product market prices are higher than CCC purchase prices. The M-W price itself becomes largely an administratively determined price when product prices are at or close to CCC purchase prices. Manufacturing grade milk prices are supported by government purchases of butter, cheese, and nonfat dry milk powder. Although the plants are still free to bid for available milk supplies, the prices they can pay producers are constrained by the prices they receive for the products. Major advantages of competitive series for pricing reserve milk in Federal orders are that usually they automatically reflect changes in processing costs, product values, and product yields. Competitive conditions force firms to maximum processing efficiency regardless of the level of support.

A single competitive price series also provides an incentive for regulated plants to allocate reserve milk to the highest return manufactured dairy products. One disadvantage of the currently used competitive price series is that the price is strongly influenced by cheese prices. At times, this effect places plants making other products, such as butter-powder, in the position of having to pay prices higher than they can get out of the milk they process. Several positive and negative factors associated with the use of competitive pay price series were noted in that section of this report.

Even after there is no longer any nonregulated manufacturing milk, use of a competitive price series could be continued by some setting aside of manufacturing dairy product plants from minimum Federal order pricing provisions. One possibility is to exempt from minimum pricing all plants in the upper Midwest that are producing only Class III products. Exemption of these plants would permit them to pay whatever price that competition among them would establish. The average pay price for these plants would be used as the Class III price for all other manufacturing use milk in Federal orders. Producers shipping milk to exempt plants would receive an equalization payment in addition to the plant pay price to make their returns comparable with returns to producers shipping to nonexempt plants.

The equalization payment would be the difference between a specified equalization price and the blend price to producers shipping milk to nearby nonexempt plants. Collections for the equalization could or should be from all other Federal order markets. In addition to providing a competitive pay price series, the rationale for equalization payments is that classified pricing of milk is a discriminatory price system that depresses manufacturing milk prices while raising total returns for milk in all uses. The procedure extends the pooling concept to provide for more equal sharing of Class I sales and more equal sharing of reserve milk supplies across all regulated markets.

2. The product price formula approach to Class III pricing utilizes product prices, product yields per hundredweight of milk, and processing costs to develop pay prices for manufacturing use milk. Two types of product formulas have been used in Federal order pricing—a butter-powder formula and a cheese formula. These formulas were dropped in most Federal orders as a matter of policy because they reflected excessive differences in prices between regulated and nonregulated manufacturing milk plants, due in part to difficulties in specifying appropriate make allowances. If all manufacturing use milk were to become regulated, the differential price problem would cease to exist.

Inputs for product price formulas normally have been obtained from a number of sources. Additional sources are possible. Wholesale prices for butter and cheese are reported on commodity exchanges. The Market News Service of the USDA reports wholesale selling prices for nonfat dry milk, cheese, and butter at various assembly points. Reported plant prices are available for nonfat dry milk but not for butter or cheese. Observers generally believe that f.o.b. plant prices for butter and cheese could be developed if industry cooperation could be secured.

Yields of product per hundredweight of raw milk are not fixed factors. They vary with solids content of raw milk, product specifications, and solids recovery in the processing operation. However, for administered price purposes, average values may be used to simplify the process.

Processing allowances for product formulas can be derived from several sources. As long as substantial quantities of nonregulated milk are marketed, average apparent margins can be calculated by subtracting the reported plant pay prices from the gross returns per hundredweight of milk. Gross returns from the sale of product are determined from yields and wholesale market prices for the product.

Analysis of plant records from a sample of manufacturing plants can be used to determine costs. However, this report illustrates a number of major problems with the method, including allocating of costs in multi-product plants and firms, different depreciation schedules, different capital costs, and different methods of valuing inventories. Furthermore, the plant record procedure is likely to be a costly method of margin determination.

Indexing of some base period cost or margin is another way of determining processing allowances. The index could be computed from reported wage rates and prices or price index for specified inputs.

In the course of the study, considerable effort was directed to evaluating and refining the types of product price formulas generally considered most relevant. Assuming the estimation of an acceptable make allowance, and assuming agreement on the adequacy of product prices, the following product price formulas with specified yield factors were advanced to estimate prices per cwt of milk testing 3.5% butterfat.

1. Butter-powder formula
   (Grade AA butter price per pound at Chicago Mercantile Exchange times 4.27) plus (nonfat dry milk price (spray) per pound in Central States area times 8.3) minus make allowance (currently $1.16).[30]
2. Cheese formula
   (Weighted average of Wisconsin primary market, barrel and 40-lb block, cheddar cheese price per pound times 9.66) plus (Grade A butter price per pound at Chicago Mercantile Exchange times 0.3) plus (edible dry whey powder price per pound in Central States area minus 10 cents times 5.5) minus make allowance (currently $0.88).[30]
3. Butter-powder-cheese formula
   The preceding product price formulas for milk used for butter-powder and milk used for cheese are weighted annually in proportion to the relative quantities of milk used to produce nonfat dry milk and cheddar cheese in Minnesota and Wisconsin in the preceding year.

The product price formula approach has often been considered by some interests in the dairy industry to be an appealing method of pricing Class III milk. It is easily understood and it directly ties the milk price to the prices received for the products. If product prices are not at government purchase price levels, the formula price reflects, at least partially, competitive market clearing forces. Also, if multiple reserve classes are adopted, product price formulas are better adopted to establishing the separate usage values for butter-powder and cheese.

3. A third option for pricing Class III milk is an "economic indicator formula." This mechanism sets price by adjusting a base period price by an index which represents supply factors, or demand factors, or both. The procedure has been used in past years for pricing Class I milk in some Federal order markets. The adjusting index was determined by weighting measures of consumer incomes, wholesale prices, and input prices. The current price support and parity price for milk are computed with an economic indicator type formula.

If economic indicator formulas had been used for pricing manufacturing use milk, they undoubtedly would have presented substantial differences between prices of regulated and nonregulated milk. Again, as most or all milk becomes regulated, the problem of different prices disappears.

The major problem of an economic indicator formula for manufacturing use milk pricing is the uncertainty that it will balance milk supply with demand. In the situations where manufacturing grade milk continues to be in substantial supply, or where the price support purchase program was absent, determination of reserve milk prices that accurately reflect current market values would be essential. An economic index formula could not serve that purpose effectively. With no Grade B supplies but with a price support program available, closer coordination between the Federal milk order program and the dairy price support program would be required if an economic indicator formula were used. Even so, extreme difficulty would be experienced in maintaining a market clearing price.

4. The preceding mechanisms of Federal order pricing are all types of automatically adjusting pricing formulas. Another alternative is to directly fix the reserve milk price solely on the basis of evidence presented at public hearings. No class price adjustments would occur until the next hearing. The procedure was used in early years of the Federal order program, but for fluid use prices only.

The use of the hearing process to directly fix manufacturing milk prices has the advantage of permitting almost any relevant factor to be considered in the pricing process. The formula approaches adjust only to those factors included in the formula. There are, however, some basic disadvantages in establishing reserve milk prices directly by public hearing.

[30]The make allowances for butter-powder and cheese are taken from Tables 37 and 39. The 10 cent make charge per lb of dry whey is a 1977 breakeven cost estimate for dry whey costs and prices.

TABLE 47.—Analysis Summary: Effectiveness or Impact of Alternative Milk Pricing Mechanisms.

Objective or Criterion	Reserve Milk Pricing Alternative: Competitive Pay Price Series — Lower Price†	Competitive Pay Price Series — Higher Price‡	M-W Price in Some Markets U. S. Average in Others*	Butter-Powder-Cheese-Formula — Lower Price†	Butter-Powder-Cheese-Formula — Higher Price‡	Product Price Formula-Separate Price for Butter-Powder and for Cheese — Lower Price†	Product Price Formula-Separate Price for Butter-Powder and for Cheese — Higher Price‡	Public Hearing	Economic Formula
Objective									
1. Maintain adequate manufacturing outlets	1	3	1	1	3	1	2	5	5
2. Establish price related to value of manufactured products	3	2	2	3	2	1	1	4	5
a. Does not encourage withholding from Class I	4	1	2	4	1	5	3	5	5
b. Does not price undercut manufacturing grade milk price	3	1	2	4	1	5	3	5	5
c. Price will clear the market of supplies	1	3	1	3	5	2	5	6	6
3. Allocates reserve supply to highest value use	1	1	1	1	1	7	6	4	4
4. Price does not arbitrarily affect resource allocation	2	1	1	3	2	4	4	6	6
5. Price will provide equity within and among markets	2	3	2	3	4	3	3	4	4
Administrative Criteria									
6. Establishes price on current and efficient basis	1	1	1	1	1	1	1	7	3
7. Price mechanism not complex	1	1	1	1	1	1	1	1	5
8. Mechanism must be workable	2	2	5	4	4	5	5	5	7

Rating Scale:
1 = Effectively meets objective
2 = Meets objective
3 = Tends to meet objective
4 = Neutral or uncertain
5 = Does not adequately meet objective
6 = Does not meet objective
7 = Seriously thwarts accomplishment of objective

*Assumes M-W price in markets where volume of reserve is large and can be handled more efficiently, and U. S. average in markets where quantity of reserve is relatively small and irregular.

†Level approximating U. S. manufacturing price.

‡Level approximating M-W level.

First, the hearing is a costly procedure for participants. Since more frequent hearings would be required if hearings are used for direct pricing, the cost of the procedure is likely to be very large. Second, the hearing process is unwieldy and time-consuming. It may not be able to adjust prices rapidly enough to changing economic conditions.

Of the four mechanisms for pricing manufacturing use milk under Federal orders, a competitive price series or a product price formula are likely to lead to the fewest problems in clearing the market. Both assure that if total milk supply expands relative to demand, prices will adjust downward (to the price support level) and cause more products to move into consumption and discourage production. Conversely, with expanding demand relative to supply, the two mechanisms will bring increased milk prices. In other words, these two mechanisms are more likely to bring about necessary resource adjustments in a regulated dairy industry than either economic indicator formulas or direct pricing through public hearings.

The relative applicabilities of the four pricing alternatives can be evaluated in more specific terms by relating each alternative to: 1) the several reserve milk pricing objectives, 2) the specified administrative criteria, and 3) the three complex issues of reserve milk pricing that were analyzed. In the tableau that follows, the objectives and the criteria are assigned values, on a scale of one to seven, that reflect the estimated effect of a given pricing procedure on the relevant objective or criterion.

Since any evaluation of the pricing procedures, especially of the competitive pay price and the product price formula, is substantially affected by the level of prices generated by the procedure, columns reflecting a higher price level and a lower price level are included for the two primary alternatives. The matter of different price levels for the same procedure is an integral part of the reserve pricing problem. For example, competitive pay prices are usually several cents per cwt higher in the Minnesota-Wisconsin price series than they are in the U. S. average manufacturing price series. Similarly, product price formulas using the derived margins approach reflect a smaller make allowance and therefore a higher reserve price than do product formulas using the higher make allowances associated with CCC purchase prices. The differential effects of the level of reserve price established are indicated in the low price and high price columns for the competitive pay price and the product price formula approaches.

It is evident from the assigned values that the competitive pay price series and product price formula alternatives relate to the eight objectives and three criteria on a superior basis relative to the other two approaches. Also, with respect to the matter of low and high reserve prices that may be established by a given approach, a low/high reserve price established by competitive pay price procedures obviously would have some similar impacts to a low/high reserve price established by product formula. Within a given approach, however, a lower price will be more apt to maintain adequate manufacturing outlets while a higher price will be more apt to discourage any withholding of Class I shipments. The high price-low price differences are subtle but need to be recognized.

The two primary alternatives of competitive pay prices and product price formulas also need to be weighed in relation to the complex issues in reserve milk pricing, *i.e.,* the matter of the same or different reserve prices in different markets, the matter of how many reserve usage classes to define, and the level of efficiency to which the reserve price should be geared.

If different reserve prices were used in different markets depending on market characteristics, product price formulas could be adopted on a more precise basis to reflect the appropriate reserve price for a market. For example, in a smaller volume market where butter-powder dominated reserve usage and most reserve handling was the responsibility of one cooperative, a product price formula clearly would offer the best fit to that market's situation and to meeting the objectives of reserve pricing. However, if a single reserve price is used in all markets, a competitive pay price, for the several reasons noted elsewhere, would serve the objectives of reserve pricing on a superior basis.

Multiple reserve class pricing would be better served by product formulas than by competitive pay prices. Product formulas could be specified separately for butter-powder and for cheese. Most of the objectives of reserve pricing relate positively to product formulas in the multiple reserve class context. The only apparent shortcomings would be in the areas of allocating reserve supplies to the highest value use and price equity among markets. With a single reserve class, however, the specific advantages of product formula pricing diminish, and the advantages of competitive pay pricing in relation to market clearing, supply allocation, and equity within and among markets are substantial.

With respect to the issue of what level of efficiency the reserve price should be established, both the competitive pay price and the product price formula approaches may be constructed in ways that tie directly to the efficiency level desired. For the competitive pay price approach, the sample and location of plants to be used is basic to the efficiency level specified. In product price formulas, make allowances may be adjusted arbitrarily to pursue the recognized efficiency level. Both pricing approaches are suitable for handling the efficiency issue. Other factors than the issue of efficiency level must be looked to in rationalizing the choice of pricing procedure.

Although the comparable effects of the competitive pay price series and product price formula may be arguable, the consistent assignment of higher values to the competitive pay price series relative to objectives and administrative criteria suggests that systematic efforts be directed to retention of such a procedure. The primary basis for shifting to product price formula procedures is the pragmatic consideration that it can be available in the future without resorting to significant changes from current procedures. To the extent that competitive pay price procedures may in fact reflect a superior performance if they can be retained, the pragmatic considerations associated with the product price formula approach should be weighed less heavily. As for the three complex issues that were noted, competitive pay pricing equates very well with the objectives of reserve milk pricing in the single reserve class and price in all market situations, while product formula pricing would better serve the objectives where reserve prices are different in different markets and multiple reserve classes are defined.

Temporal Aspects of Reserve Milk Pricing

Mechanisms for pricing reserve milk are not under immediate time pressures since the manufacturing grade milk market continues to provide an ample basis for generating competitive pay price series. However, substantial differences in the values of milk for butter-powder and cheese during the 1973-76 period and the substantial weight cheese has in the M-W price series have caused some interests to argue for alternative means of pricing reserve milk even while Grade B supplies are in substantial quantity. In the longer run, the continued erosion of Grade B supplies will necessitate the development of different pricing procedures. In specifying the several alternatives that might be pursued in reserve milk pricing, the question of *when* a given procedure might be used must be recognized. The availability or nonavailability of a viable manufacturing grade milk market is a key determinant of the relevance of any particular choice among the reserve pricing alternatives.

Retention of a form of a competitive pay price series by some type of suspension of Class III pricing of pooled milk in the upper Midwest primarily is a long-run consideration. It is neither necessary nor advantageous to attempt to implement such a procedure in the immediate future because prices from the manufacturing grade milk market are performing that task.

Product price formulas have different temporal implications, depending on the particular ways in which they are constructed and used. For example, the use of the "apparent margins" application of product formulas requires that a competitive pay price series be available to measure the apparent margin. Therefore, the apparent margin can be used only as long as there is a legitimate Grade B market. This requirement limits interest in the approach somewhat because the availability of a competitive pay price series detracts from any obvious need to use apparent margins. However, the apparent margins approach could be used directly in the short run in lieu of direct use of a competitive pay price series, especially if separate prices for milk used for butter-powder and cheese were desired. Through lagging or averaging procedures, month-to-month price changes in reserve milk prices could be made. Of course, this could complicate market clearing problems in periods when the apparent margins price deviated significantly from the competitive pay price. For longer run purposes (when all milk is Grade A), the apparent margins that were generated while Grade B supplies still reflected a competitive price could be adjusted with various cost indexes to provide an estimated continuing make allowance for a product price formula. In this sense, the apparent margins approach would serve as an initial input to product price formulation after conversion to Grade A largely has been accomplished.

Product price formulas appear to be a feasible method of pricing reserve milk in both the short run and the long run. In the long run, in spite of problems associated with adopting appropriate factors in the formula, product price formulas clearly represent an important alternative for pricing milk used for manufactured dairy products.

Prospects of using either the public hearing process directly or an economic index formula to price reserve milk are more remote because of the problems associated with generating realistic market value prices through such procedures. Neither alternative has persuasive attributes as long as competitive pay prices are available from the manufacturing grade milk market. In the long run, with most milk converted to Grade A, the hearing process or the economic index process could be used, but would likely perform in an inferior manner relative to product price formulas or other procedures that might be developed. In the situation where most milk marketed is Grade A and where a dairy price support program is in operation, the support price, which is a type of economic index price, and the reserve milk price could be viewed as one, and price support operations could be geared to effecting that price.

In summary, the relevance and feasibility of any given reserve milk pricing procedure is partly related to whether manufacturing grade milk supplies are sufficient to provide a competitive market situation, or whether conversion to Grade A production and marketing largely has been accomplished.

Two other issues in pricing manufacturing use milk were examined in the study: 1) the number of manufacturing use classes in each market, and 2) different prices between markets for given manufacturing uses. The arguments for multiple manufacturing prices are that processing cost differences between markets and plants are caused by factors that do not apply to nonregulated plants. Therefore, minimum prices in each regulated market should reflect these differences. Cost differences occur because of large differences in daily and seasonal variations of milk receipts, low total volumes of manufacturing use milk in many of the fluid milk markets, and differences in net returns between manufactured dairy products. The latter argument is supported by the fact that cheese plants in Minnesota and Wisconsin have, during past decades, generally paid more for milk than butter-powder plants. Although all the arguments have some validity, there are important advantages in maintaining a single price both within and between markets. A single price tends to assure maximum processing efficiency as well as allocations of milk to highest return uses.

The essential implications of this study are that changes in the milk market will require new pricing arrangements in Federal milk orders. Leadership across the dairy industry as well as public agencies associated with the dairy industry should be directing increased attention to this problem. Administered price regulations require systematic procedures for price establishment. Such procedures have to accomplish the key objectives of reserve milk pricing. In the past, the availability of competitive pay price series has provided an easy and effective alternative for reserve milk pricing. The evolution toward an all Grade A regulated milk industry in the United States will remove access to a competitive pay price series as it is now defined. The alternatives posed in this study provide a starting point for developing a method or methods for pricing reserve milk that will prove workable in the market and measure up to the purposes of reserve milk pricing.

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